Centre for Resource Studies
Queen's University
Kingston, Ontario

National Resources and International Bargaining Power: Canada's Mineral Policy Options

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Canadian Cataloguing in Publication Data

Caragata, Patrick James, 1948
National resources and international bargaining power

(Monographs)
Bibliography: p.
Includes index.
ISBN 0-88757-036-4

1. Mineral industries - Government policy - Canada.
2. Industry and state - Canada. I. Queen's University (Kingston, Ont.). Centre for Resource Studies. II. Title. III. Series: Monographs (Queen's University (Kingston, Ont.). Centre for Resource Studies)

HD9506.C22C37 1984 333.8'515'0971 C84-098970-9

© ISBN 088757/036/4
Centre for Resource Studies, 1984
Queen's University

TO WENDY CREESMAN

Preface

The Canadian mineral industry operates in an international environment, exporting most of its output at prices determined on world markets, selling to consumers whose purchasing policies are dictated by political as well as economic motives, and competing with producers whose activities may also have both political and economic motives. At the international level, these political components of the mineral supply and demand process are known as resource diplomacy, and have become an increasingly important aspect of international trade in recent years. This study describes the evolution of mineral resource diplomacy and its instruments, and looks at the resulting opportunities and constraints facing the Canadian mineral sector. It is hoped that the work will provide a useful background of information on the subject of resource diplomacy, and will also provide guidance to both public and corporate policy makers in their endeavours to maximize the benefits to Canadians of Canada's mineral endowment.

The Centre for Resource Studies presents the results of scholarly research in non-specialist terms and in a form readily usable by policy makers and other interested groups. We feel this study will provide a factual basis for more informed discussion of policy issues affecting the Canadian mineral industry.

Views expressed are those of the author, and do not necessarily represent the views of the Centre for Resource Studies or its sponsors.

Brian W. Mackenzie
Interim Executive Director
Centre for Resource Studies

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Author's Foreword

The resource diplomacy debate in Canada has persisted for about one hundred years. The debate is a vital one because of Canada's significant international role as a producer and exporter of mineral resources. The debate is also critical because of the considerable change that has taken place this century in the relations between exporting countries, importing countries, and international mining companies. One predominant feature of this changing relationship has been the advent of increased government intervention by the exporting countries. The policy options Canada chooses will have a major impact on the country's economy and politics for years to come. Therefore we must choose wisely and carefully. I have written this book to bring to bear a common-sense perspective on the debate by marshalling evidence that others have ignored or failed to collate.

The genesis of my research was a doctoral thesis in political economy at the University of Toronto which I completed in 1981. I wish to thank Professors Robert O. Matthews, John W. Holmes and Gerald K. Helleiner of the University of Toronto for their encouragement and their faithful attention to substance and detail which allowed me to learn with enthusiasm from my mistakes.

I would like to thank Dorothy Walters, one of Canada's most eminent and colourful economists, for reviewing the original manuscript and for exhorting me to approach the Centre for Resource Studies to have my research published. Dr. David Yudelman and Margot J. Wojciechowski of the Centre provided invaluable assistance and guidance in my efforts to focus, update, expand and restructure my research on Canadian policy and resource diplomacy.

I owe a debt of gratitude to Professor Jean Kirk Laux of the University of Ottawa for her unflagging support and insightful critical commentary. I would also like to express my appreciation to Bill Jackson, John Brennan and Bob Keyes of the Department of Energy, Mines and Resources for their assistance. Because of my busy schedule I depended on the valuable efforts of Gerard McMullen for research assistance and Gisèle St. Pierre for processing and proofreading the text. Finally, I would like to thank my wife, Wendy Cressman, who acted as my research assistant and cheerleader. I am grateful for all of this assistance but I am solely responsible for the interpretations, conclusions, errors and omissions in this text.

Patrick James Carrigata
Ottawa, Ontario, Canada
June 1983

Summary

Minerals are the fundamental building blocks of civilization. They play a far more important role in international trade and politics than statistics indicate. For this reason minerals have often been the subject of conflict between exporting countries, multinational corporations, and importing countries. While the exporting countries have pressed for more control of the mineral development process (from exploration to end-product pricing), the mining companies and importing countries have expressed and acted on their concern about access to mineral supplies on equal terms, security of supply, and equitable prices.

Exporting countries have used various unilateral and multilateral tactics and strategies to achieve their goals of improving their situation. This exercise has been labelled resource diplomacy. Resource diplomacy is a double-edged sword: the benefits are accompanied by costs, and quite often the costs can be considerable. For example, India was once a significant manganese exporter. An ambitious export tax changed that and encouraged manganese production in other countries. This is an example of conflictive resource diplomacy. Most such efforts have failed. The longest running success has been OPEC, but it too has fallen on hard times due largely to internal conflict, a fall in demand, and increased production outside the cartel. International commodity agreements for minerals do not appear to be either generally effective mechanisms for price and revenue stabilization or efficient mechanisms for transferring wealth to Third World countries.

Since World War II, Canada has been one of the most favoured locales for mineral investment in the world. As a result Canada has become the third largest mineral producing country in the world and the largest per capita exporter. Canada's mineral exports are sold primarily to the large industrial markets: the United States, the European Economic Community and Japan, all of which are dependent in varying degrees on Canadian exports. Thus, at first glance, it seems that Canada is well-positioned to utilize nonfuel minerals as bargaining tools in its relations with its major trading partners.

A more detailed assessment of this assumption shows the dangers of uncritical optimism about Canadian mineral resource bargaining power. An investigation of the critical factors which determine Canada's bargaining leverage for nonfuel minerals reveals that Canada has good potential leverage

for only two minerals: asbestos and potash. Cartel options for potash, asbestos, nickel and copper are strictly limited by various factors.

If current options for conflictive resource diplomacy are closed, this does not mean that Canada should abandon this option. Great strategic thinkers never abandon any potentially useful option. The key to making a decision has to do with the balance of strengths and weaknesses, and costs and benefits, and an assessment of good timing. Nonetheless, the only effective long-run strategy that Canada can utilize to harmonize and attain its resource diplomacy goals is to improve the competitive viability and market access for Canadian mineral exports. This is the essence of cooperative resource diplomacy with consuming countries.

This analysis has led to a number of recommendations for Canadian mineral policy makers, among which are the following:

- Canadian mining companies should be encouraged to form joint ventures with Western European, Japanese, and American mining companies in Canada;
- Canada should call upon its military allies in NATO and NORAD to emphasize the economic provisions of their military treaties with Canada and include strategic and critical minerals from Canada in preferential market access agreements;
- the Government of Canada should lay the groundwork in the OECD for imposing countervailing duties against 'dumped' mineral exports from the Soviet Union;
- Government of Canada should amend the Combines Investigation Act to make Canadian participation in mineral cartels legal, or at least subordinate to the Export-Import Permits Act;
- the USA has a double standard when analyzing cartel action: the Webb-Pomerene Export Trade Act of 1918 exempts American companies from prosecution for participation in cartels as long as there is no effect on supplies and prices in the U.S. market; yet, at the same time, the Anti-Trust Division of the U.S. Justice Department espouses competitive principles which it sometimes seeks to extend to other countries through extraterritorial application of U.S. laws. At the very least, this suggests that Canadian policy makers should drop their naiveté about Canadian participation in cartels;
- while it would be be foolhardy for Canada to join any cartel at the present, there are signs that demand and prices for asbestos will dip dramatically some time before the end of the century. Accordingly, the Government of Canada should be prepared to join with the Soviet Union and South Africa in a cartel to stabilize the asbestos industry in Canada.

In general, Canada should build on its comparative international strengths, and assess critically the trade-offs between the potential benefits and costs of resource diplomacy action. Canada must always be prepared for thoughtful resource diplomacy action, recognizing the distinctions between conflictive and cooperative resource diplomacy and their consequences.

Résumé

Les minéraux sont les fondements de notre civilisation. Ils jouent un rôle beaucoup plus important, au niveau de la politique et des relations internationales, que ne le montrent les statistiques. Pour cette raison, les minéraux sont souvent une source de conflits entre les pays exportateurs, les corporations multinationales et les pays importateurs. Pendant que les pays exportateurs font pression pour améliorer leur contrôle du processus d'exploitation des minéraux (de la prospection à la tarification des produits finis), les compagnies minières et les pays importateurs expriment leurs inquiétudes et agissent en fonction des problèmes tels que l'accès aux sources de minerai à des conditions équivalentes, la sécurité d'approvisionnement et les prix équitables.

Les pays exportateurs se servent de diverses tactiques et stratégies, unilatéralement et multilatéralement, dans le but d'améliorer leur situation. Cet exercice est désigné sous le nom de diplomatie des ressources. Ce genre de diplomatie est une épée à double tranchant: les bénéfices s'accompagnent de coûts bien souvent considérables. Par exemple, l'Inde était autrefois un important pays exportateur de manganèse, mais une ambitieuse taxe d'exportation a modifié cette situation et a favorisé la production de manganèse dans d'autres pays. Ceci est un exemple de diplomatie de ressources contradictoire. La plupart de ces tentatives ont échoué. Le plus important succès actuel est l'OPEP, mais il connaît également une période difficile à cause de conflits internes, d'une chute de la demande, et une augmentation de la production en dehors de l'OPEP. En règle générale, les traités internationaux relatifs aux minéraux ne semblent pas être des mécanismes efficaces pour stabiliser les prix et les revenus ni pour assurer un transfert de la richesse vers les pays du Tiers-Monde.

Depuis la deuxième guerre mondiale, le Canada constitue un des endroits préférés au monde pour ceux qui investissent dans le domaine minéral. Il en résulte que le Canada est le pays le troisième en importance comme pays producteur de minéraux au monde et le plus important pays exportateur per capita. Les minéraux exportés sont vendus principalement aux grands marchés industriels: les Etats-Unis, la Communauté Economique Européenne et le Japon, tous des pays dépendant à divers degrés des exportations canadiennes. Ainsi, au premier abord, il semble que le Canada est en excellente position

pour utiliser ses minéraux non combustibles comme instruments de négociation dans les relations avec ses principaux partenaires économiques.

Une évaluation approfondie de cette hypothèse démontre les dangers d'un optimisme naif à l'égard du pouvoir de négociation que procurent les ressources minérales canadiennes. Une étude des facteurs décisifs déterminant le pouvoir de négociation du Canada envers les minéraux non combustibles révèle que le Canada possède un bon potential pour ce pouvoir avec seulement deux minéraux: l'amiante et la potasse. Les options de cartel pour la potasse, l'amiante, le nickel et le cuivre sont strictement limitées par divers facteurs.

Même si les options actuelles pour une diplomatie des ressources contradictoire sont fermées, il ne faudrait pas que le Canada abandonne cette possibilité. Les grands stratèges n'abandonnent jamais une option qui pourrait éventuellement s'avérer utile. Au cours du processus de prise de décision, il est essentiel de conserver un équilibre entre forces et faiblesses, coûts et bénéfices, ainsi qu'une évaluation exacte du moment opportun. Néanmoins, la seule stratégie efficace à longue échéance que le Canada peut adopter pour harmoniser et atteindre ses objectifs de diplomatie des ressources consiste à améliorer la concurrence et l'accès aux marchés de ses exportations de minéraux. Ceci constitue la caractéristique fondamentale d'une diplomatie des ressources coopérative avec les pays consommateurs.

Cette analyse nous amène à faire certaines recommandations aux responsables des politiques minérales canadiennes, par exemple:

- les compagnies minières canadiennes devraient être encouragées à former des projets conjoints, au Canada, avec les compagnies minières d'Europe de l'Ouest, du Japon et des Etats-Unis;
- le Canada devrait demander à ses alliés militaires de l'OTAN et de leurs traités militaires avec le Canada et d'inclure les minéraux canadiens stratégiques et critiques dans les ententes d'accès préférentiel aux marchés;
- le gouvernement du Canada devrait poser les fondements au sein de l'OCDE pour imposer des droits compensateurs contre le dumping des exportations minérales en provenance de l'Union soviétique;
- le gouvernement du Canada devrait amender la Loi relative aux enquêtes sur les coalitions de façon à légaliser la participation canadienne dans les cartels minéraux ou, tout au moins, de façon à subordonner cette loi à la Loi sur les licences d'exportation et d'importation;
- Les Etats-Unis utilisent un standard double lors de l'analyse de l'action des cartels: la Loi Webb-Pomerene sur l'exportation commerciale de 1918 exempte de poursuites judiciaires les compagnies américaines qui ont fait partie d'un cartel, aussi longtemps que cette action n'a aucune influence sur l'approvisionnement et les prix du marché américain; par ailleurs, la section anti-trust du ministère américain de la justice préconise

simultanément des principes compétitifs qu'elle cherche quelquefois à répandre dans d'autres pays par l'application extraterritoriale des lois américaines. Pour le moins, ceci suggère que les responsables de la politique canadienne devraient être moins naifs en ce qui concerne la participation canadienne aux cartels;

- bien qu'il serait imprudent, à l'heure actuelle, pour le Canada de se joindre à un cartel, certaines indications laissent croire que la demande pour l'amiante et le prix de ce minéral vont baisser de façon dramatique avant de la fin du siècle. Donc, le gouvernement du Canada devrait se préparer à joindre l'Union soviétique et l'Afrique du Sud dans un cartel ayant pour but de stabiliser l'industrie de l'amiante au Canada.

En général, le Canada devrait se baser sur sa relative puissance internationale et évaluer, de façon critique, le pour et le contre des bénéfices et des coûts potentiels de la diplomatie des ressources. Le Canada doit toujours être prêt à appliquer une diplomatie des ressources réfléchie, en établissant bien la distinction entre une diplomatie des ressources contradictoire et une diplomatie des ressources coopérative ainsi que leurs conséquences respective.

Glossary of Terms

Resource Diplomacy: resource diplomacy can be either conflictive or cooperative. In the case of conflictive resource diplomacy, a mineral-exporting country attempts to manipulate production, exports, prices, and markets, at a direct cost to one or more consuming countries. On the other hand, cooperative resource diplomacy places an emphasis on building bridges between the exporting and the importing country. The elements of cooperative resource diplomacy are based on maintaining an attractive investment climate for both foreign and domestic investors, emphasizing joint ventures, joint financing, forward integration into the consuming country, and information sharing. Cooperative resource diplomacy can also include agreements for preferential market access for minerals from mineral-exporting countries, and international commodity agreements.

In the case of cooperative resource diplomacy, resource diplomacy is a matter of private and/or public sector negotiation between the exporting and importing countries. Conflictive resource diplomacy is a matter of negotiation among producing countries which in turn present a common front (if there is a need for exporting-country cooperation) against consuming countries.

International Producer Cartel[1]: this is an agreement among raw material suppliers located in different countries to raise the price of a specific commodity by restricting exports and fixing prices.

Producer Association[1]: producer-exporters of the same commodity formally cooperate to achieve common objectives. Producer associations have been formed to stabilize production or eliminate excessive price fluctuations, or both; hold market prices above production costs; counterbalance the power of private multinational corporations; secure a strong bargaining position from which to negotiate with consumers; and disseminate information among members in political, economic and technical matters. In striving for these objectives, a producer association stops short of price fixing.

International Commodity Agreement: an International Commodity Agreement (ICA) is an agreement between producing and consuming countries to try to dampen dramatic swings in price for a particular mineral. The methods usually include production and export controls (supply management) as well

as a buffer stock. The buffer stock (a stockpiling of minerals from the exporting countries) is used to intervene in the market, with the manager of the buffer stock normally being required to buy supplies from the member exporting countries when prices fall below various minimum points, and to sell supplies when prices rise beyond various maximum points. Financing for the stockpile may come from the exporting countries or from both exporting and importing countries which are members of the agreement. ICAs for minerals are usually more successful in defending the minimum points (the floor) than the maximum points (the ceiling).

Nonfuel Minerals: this includes any mineral which is not directly utilized to produce energy. It generally refers to ferrous (iron ore, chromium, manganese, vanadium etc.) and nonferrous minerals (copper, lead, zinc etc.), as well as nonmetallic (phospate rock, asbestos, potash etc.) minerals.

1. Introduction

Background to Current Development

Minerals are the essential building blocks of industrial civilization. Without minerals there would be no civilization as we know it. But reaching our current plateau of mineral use was a slow process.[2] While the use of precious minerals (e.g. gold and jade) dates from primitive times, man's systematic exploitation of minerals did not begin until the Bronze Age (circa 4000 B.C. in the Sinai Peninsula). The Bronze (copper-tin/zinc) Age lasted until the Hittites initiated the Iron Age about 1500 B.C. in Asia Minor. The Iron Age stretched on for 3,300 years until the advent of the industrial revolution.

What changed everything was the process of invention, resulting in new processes and technology which were often intended, initially at least, to serve the mining industry. For example, 'steam engines were first used for ventilation and pumping; railroads, for transportation of heavy loads of ore'.[3]

With the discovery of a cheap method of steel production, new transportation technology, and electrical power generation, the modern vital role of minerals in industrial economies was confirmed. Yet even in 1900, the mineral base of most nation-states was typically limited to a few minerals: copper, lead, zinc, silver, gold and iron. As the twentieth century progressed, quantum leaps were developed in metallurgy, partly due to intensified research for military purposes during the first and second world wars. By the 1950s, technological innovation had made possible the use of 'some 45 metallic elements and some 8000 alloys of these elements.'[4]

The greater man's ingenuity has been in discovering new minerals and alloys and in finding new ways to utilize known minerals, the greater his dependence on them has become. If all nations were well endowed with minerals, the procurement of these building blocks would largely be a matter of domestic policy. But that is not the case. Mineral procurement is a vital international issue precisely because the distribution of known minerals around the globe is not equal.

The lack of self-sufficiency in mineral resources was one of the prime motives earlier in history for military adventurism and colonization. The Spanish plundering of gold and silver in the Andes and the Sierra Madre in the 16th century was but one example. It may overstate the case to say that

> throughout history, minerals and their exploitation have been at the root of much of the world's troubles, as nations went to war over access and security of supply for raw materials – often under the guise of other reasons, usually political.[5]

Nonetheless, it would be difficult to ignore the mineral-related issues that surface in discussions about conflict in the Middle East, Zaire, Angola, Namibia, Zimbabwe and South Africa.

Mineral dependence, the withholding of mineral supplies, and a foreign presence which controls a country's development of minerals, all touch a raw political nerve and reveal a critical economic weakness. If the nerve is aggravated long enough, a country can be thrown into chaos and, given the international dimensions of mineral procurement, there is the evident enduring potential for the creation of international tension and possibly armed conflict. The delicacy of the matter, laden as it is with interdependence, calls for responsible behaviour and a willingness to negotiate and compromise.

Most mineral trade between exporting and importing countries may involve conflict, but certainly not to the point of war. Such conflict usually involves disputes over ownership, control, contract terms, taxation, and prices.

The 1970s were characterized by an intensified effort among many mineral exporting countries to utilize minerals for national and international economic and political objectives. The embers of resource nationalism which had been glowing for years were fanned by the success of OPEC in 1973. Mineral resources came to be perceived, largely among less developed countries (LDCs), as exploitable panaceas amidst the confusing and frustrating problems besetting domestic growth and development and international trade.

Many LDCs view mineral development as their best available engine of economic growth. Moreover, they often calculate that, since developed countries are the primary markets for their minerals, since they perceive the terms of trade for minerals to be in favour of developed-country manufactured exports, and since they frequently encounter unfair trade barriers to their products in the developed world, the best solution is to organize with other mineral exporting countries a cartel-like arrangement to raise prices and revenues. Where this fails, for whatever reason, governments of mineral exporting countries (almost exclusively from the Third World) see value in developing international mineral agreements between producers and consumers to stabilize prices around a gradual rising trend.

In the wave of interest that followed OPEC's success, most attempts by exporting countries to establish mineral cartels have failed. One of the problems now recognized by these LDCs is that certain developed countries, such as Canada and Australia, play a premier role in international mineral trade but do not readily leap at invitations from Third World countries to join cartels or even international commodity agreements. Australia has made

an exception with its participation in the International Bauxite Association. Although Canada did help to organize a uranium cartel (now defunct), there were no LDC participants.

Purpose and Method

For Canada these developments in resource diplomacy are quite important, given the strong role that minerals play in Canadian exports. How much bargaining power does Canada have because of its possession of and trade in nonfuel minerals? How far can and should Canada go in pursuing national aims by utilizing minerals as international bargaining tools? These are the central questions that this book will address.

The approach will be on two levels. Chapter 2 discusses the trends in this century that are identifiable in international mineral trade and development, and reviews the conflict of fundamental principles that characterize the viewpoints of most of the mineral-exporting countries, the importing countries, and the multinational enterprises. We shall observe how the exporting countries have responded by creating and attempting to create producer associations and cartels, and how, when this approach proved to be fraught with difficulty, they began to press the consuming countries to participate in international commodity agreements for minerals. This chapter will also lay the groundwork for our subsequent analysis of Canadian policy options by surveying other significant developments: world mineral exploration and development trends; the diversification and procurement practices of Canada's major trading partners; the prospects for mining the seabed and Antarctica; export stabilization schemes; stockpiling; substitution and recycling.

Chapter 3 reviews the resource diplomacy debate in Canada. After a preliminary assessment of Canada's bargaining leverage, the options of Canada's major trading partners are surveyed. A more detailed study of Canada's resource diplomacy options follows. This part of the chapter deals with: the potential for unilateral leverage; export restrictions and embargoes; Canadian policy on producer associations and cartels; cartel possibilities; and international commodity agreements.

Chapter 4 reviews the findings and delineates a series of policy recommendations.

This book sets out to provide an overview of the development of resource diplomacy in this century and analyze Canada's policy options within the context of that development. Accordingly, it is prudent that we try to understand more clearly what resource diplomacy is and what relevance it has for Canada as one of the world's major nonfuel mineral producing and exporting countries.

The General Goals of Resource Diplomacy

What are the general goals of resource diplomacy? There are various goals pursued by mineral-exporting countries; sometimes these goals are compatible and sometimes they are in conflict. The key goals of resource diplomacy from the standpoint of the exporting countries are:

i maintaining or increasing net foreign exchange earnings;
ii maintaining or increasing government tax revenue;
iii maintaining or increasing employment and skill advancement;
iv maintaining or increasing domestic control;
v increasing domestic ownership;
vi maintaining the good will of the importing country and that of the multinational companies (MNCs).

Since the exporting country does not exist in a vacuum, it is obvious that officials of the exporting country must take into account in their actions the goals of other exporting countries, the goals of the MNCs and the goals of the importing countries. The goals of the MNCs are:

i maintaining or increasing profit;
ii maintaining or increasing growth;
iii maintaining control;
iv maintaining ownership;
v maintaining good relationships with the importing and exporting countries.

The goals of the importing countries are:

i equal access to resource supplies;
ii equitable prices for the supplies;
iii security of supply;
iv maintaining or increasing employment and skill advancement;
v maintaining or increasing government tax revenue;
vi maintaining or increasing net foreign exchange revenues;
vii maintaining the good will of the exporting countries and the MNCs.

These goals are sector-related: that is to say, they revolve around the resource or commodity in question, both by intention and by definition. Extra-sectoral goals involve objectives unrelated to the commercial chain from production to consumption which characterizes minerals. Such goals could include withholding supplies in an effort to change certain aspects of foreign or domestic policy of the importing country. Extra-sectoral resource diplomacy can be a dangerous venture into economic warfare, but it is also a companion avenue of attack before, during, or after military or trade warfare.

It is obvious that the goals and tactics of the exporting country have the potential for both conflict and harmony with the goals of the importing country and the MNC.[6] The goals and tactics of the exporting country can also be in conflict or harmony with each other. For example, if an exporting country joins a cartel to increase net foreign exchange revenues, it could very well lose the good will of the importing country. In retaliation, the importing country may divert its purchases to suppliers outside the cartel. This could very possibly reduce the exporting country's foreign exchange earnings.

How successful an exporting country is in pursuing its resource diplomacy goals depends on its bargaining power and skill. The level of power that an exporting country can achieve is based on factors such as its percent share of world production and exports; price elasticity of demand and supply; recycling; substitution; shared goals with other exporting countries (if applicable); financial reserves; and the employment impact. How skillful the politicians of an exporting country are at utilizing their bargaining power depends critically on identifying and considering the various strengths and weaknesses, and the opportunities and constraints which present themselves.

Politicians must identify which goals are vital to the interests of the country. Many of the goals of resource diplomacy are unachievable for some countries. Some are irrelevant to the circumstances in which a country finds itself. Other goals, if pursued, become so costly that they become sinkholes for national wealth.

An exporting country can extend efforts to achieve its resource diplomacy objectives by unilateral, bilateral or multilateral means. The unilateral option is usually the most appealing route, at least in the short term, because a government can use its sovereign powers. This is one reason why there have been more successful nationalizations than successful resource cartels. But nationalization has its price for a country, and not many such exercises in nationalism achieve their original goals. Bilateral options such as joint ventures, long-term contracts, or tacit price cooperation between monopoly producers (for example, the USSR and South Africa in diamonds) are more complex because of the need for negotiation and joint decision making. But such bilateral ventures have the advantage of being in the interest of two parties, if such interest can be sustained. Multilateral options such as international commodity agreements and producer associations are inevitably the most complex and difficult avenues to attain the general goals of resource diplomacy. If successful, such options can be very rewarding, but they too have their costs, as is evident in the encouragement of bauxite production outside Jamaica and oil production outside OPEC.

Whatever strategy and combination of tactics an exporting country chooses to meet its general goals of resource diplomacy, it must reckon with the costs and conflicts that such efforts will entail. Policy makers must ascertain the extent to which the general goals of resource diplomacy are

relevant to their country's needs; but more particularly, they must investigate the short- and long-term viability of the means to achieve these general goals.

Policy makers must always keep their options open, without remaining paralyzed by indecision. They should mix unilateral, bilateral, and multilateral approaches, to the extent that such approaches are relevant, feasible, and economically rewarding. They should prepare short- and long-run strategies, recognizing the need to adapt to changing circumstances. Timing is always important. The following discussion will attempt to provide some guidelines for an analysis of Canada's approach to resource diplomacy goals.

The Relevance of Resource Diplomacy Goals to Canada

The general goals of resource diplomacy mentioned in the previous section are in fact strategies for achieving the broad goals of national viability and advancement. In the same way, the general goals of resource diplomacy can be broken down into more specific strategies, each of which in turn can be broken down yet again. For example, one way of increasing net foreign exchange revenue is participation in a cartel which is successful. In order to develop a successful cartel, a country must choose a mineral sector which has the appropriate mineral supply requisites (for example, low levels or absence of recycling, of substitution, and of foreign stockpiling). Even given the necessary requisites, coordination of production, export and pricing policy among all members will require additional strategies to ensure success. In this way we can see that each of the general goals of resource diplomacy requires an integrated set of goals and strategies.

An effective long-run approach to resource diplomacy is one which rests on integrated strategies which foster the achievement of all or most of the general goals of resource diplomacy. Cartel participation and membership in an international commodity agreement are not, in most cases, the best ways of harmonizing the attainment of the general goals. For example, if Canada were to participate in a cartel it would alienate its major trading partners and, perhaps, in the medium to long term, undermine its own goals of increasing net foreign exchange revenue, due to the development of supplies outside the cartel. This could undermine other general goals as well.

The only effective long-run strategy that Canada can utilize to attain the general goals of resource diplomacy is to improve the competitive viability and market access for Canadian mineral exports. This does not mean that Canadian policy makers should ignore or dismiss such options as participation in cartels, producer associations, international commodity agreements, stockpiling, or even direct subsidization. Rather, if such options are viable at all (and most are not), they are usually viable only in the short run.

Few countries have achieved the nirvana of capital abundance supposedly inherent in the dream of resource diplomacy success. Most nonfuel mineral

cartel attempts had failed by the mid-1970s. International commodity agreements became the new hope, only to become bogged down in economic reality and political infighting. No new commodity agreements for minerals were created. By the early 1980s, with two steep recessions in ten years, the flames of resource nationalism, including last-resort nationalization, had been largely reduced to smoldering ambitions. However, when the next commodity boom hits, possibly in the mid-to-late 1980s, the lack of investment in new mines may leave many producers again in a commanding position, until the next serious recession. Arguably, this is the wrong way for world development to proceed. The business cycle, particularly if synchronized throughout the world, is a threat to international cooperation, and presents the greatest risk for mining companies which are overtaxed or nationalized at the peaks or subject to adversity in the troughs. But current proposals for a new international economic order including the Common Fund and international commodity agreements do not seem to be the right answers. The optimal course is the diversification of Third World economies and action to promote the liberalization of international trade.

2. Twentieth Century Trends in International Mineral Development and Trade

A Conflict of Fundamental Principles

There are two major developments in the international political economy of mineral resources that have set the scene for present problems and discussions. The first development is the changing perspectives of the resource-exporting countries, and the second concerns the perspectives of the major importing nations.

EXPORTING COUNTRIES

Exporting countries have come to place new importance on the principle of sovereignty whereby they claim the right to intercede, publicly or privately, in various stages of the mineral development process (from exploration to end-product production and price) for their own benefit. Historically, this trend was built on a series of initially unrelated episodes that reflected the needs of the times, as the following examples suggest.

1916 – The Canadian federal government and the Province of Ontario forced the International Nickel Co. to set up the first nickel refinery in Canada. At the time, both governments were worried that Canadian nickel was falling into German hands, since the United States, where an International Nickel Co. refinery existed, was still neutral in the first world war and continued to maintain trade relations with Germany.[7]

1917 – Russia initiated some procedures to expropriate foreign-owned oil companies.[8]

1931 – Bolivia and Thailand became the first sovereign and independent resource exporting countries to join a cartel (tin) for the purpose of controlling output among producers to protect price levels.[9]

1938 – Australia placed export controls on iron ore, fearing that iron ore reserves were being depleted too rapidly.[10]

1939 – Mexico became the first noncommunist resource exporting country to opt for nationalization, when it took over European and American oil firms.[11]

While at the time they occurred these isolated examples created no immediate demonstration effect, together they signalled a gradual shift in the traditional pattern of resource-supplier/resource- consumer relations and, more particularly, in the exporting countries' assessment of the value of their possessions.

After World War II, with the end of the old colonial empires and the sudden birth of many independent nations, largely poor but with great visions and needs, and with the greater accessibility of information due to technological innovation and the growth of international institutions, there appeared a growing concern with the role of minerals in the exporting country's economy and in international trade. The introduction of 50-50 profit sharing between the oil companies and Venezuela (1948) and Saudi Arabia (1950),[12] the Iranian nationalization of the Anglo-Iranian Oil Co. in 1951, and the Cuban nationalizations in 1959-60 were highlights of this cumulative process. The creation of OPEC in 1960 and the 1962 United Nations resolution declaring that all nations had a sovereign right to control their indigenous resources according to the dictates of national interest keynoted both the changing attitudes and circumstances.[13]

Of note here is the fact that the LDCs have been the standard-bearers of this movement, in contrast to the developed mineral exporters such as Canada and Australia. But the reasons for this are no mystery. The LDC mineral exporters have been beset with an almost overwhelming series of problems: spiralling population growth, very high levels of unemployment and underemployment of labour, low levels of skills, weak agricultural sectors, dual economies, massive migration from the countryside to already over-crowded and badly serviced urban areas, marked inequality in income distribution, and so forth. Where these countries possess a mineral resource of sufficient quality and quantity to be valuable in international trade, they seek to exploit it for their own needs. In the past, more often than not (although this is changing in some degree with the flow of manufacturing enterprises from the developed countries to the LDCs), these mineral exporting countries have been highly dependent on one or a few mineral resources for foreign exchange, economic growth and development in general.

Moran has analyzed the problems facing LDC mineral exporters where there is a high level of dependence on one mineral export. Referring to Chile, he observed that:

> no domestic decision about the rate of economic development, the strength of the balance of payments, the level of aggregate employment, the breadth of social welfare programs could be made without careful calculations, from outside, of how the foreign copper companies might be going to exercise their discretionary power.[14]

For many of these countries, even a 1¢ drop in the price of the mineral on world markets, or in intracorporate transfers (where the mineral is sold within a company and not traded on the open market) can mean a substantial loss

of revenue to the exporting country's government, and a drop in the country's rate of growth.

The tendency of exporting countries to pay greater attention to, and exercise more control over, their minerals reflected two significant aspects of the exporters' perspective: the belief that more domestic control is possible, and that it is beneficial. While the former was obviously true, the benefits have often been elusive.

IMPORTING COUNTRIES

The second major development in this century concerns the perspective of the most important resource-importing nations: the United States, Japan and the countries of Western Europe. They have expressed concern for three principles:

i equal access (on equal terms) to the world's resources;
ii security of supply;
iii equitable prices.

The principle of equal access is largely derived from the experiences of the 1930s, and in particular from the concern of the United States with the perceived consequences of developments at the time. In 1932, the Ottawa Agreement announced to a world of depressed economies that Britain was forming with the Commonwealth an imperial preference system, and was renouncing its free trade policy of nearly 90 years. This move to create a tighter regional economic organization was followed in fashion by Germany and Japan with their respective neighbouring countries.[15] Ironically, considering the American point of view, the Ottawa Agreement had been a reaction to American tariff legislation in 1930.[16]

However, it was more than foreign tariffs that worried the Americans. The economic regions created by the European imperial powers had existed prior to 1930. What had changed was that, in the interim, the USA had become more heavily dependent on imported minerals, and Japan had begun to embark on a policy of aggressive expansionism to secure access to raw materials and markets. Moreover, the strengthening of these economic groupings in the 1930s encouraged a flow of natural resources within the imperial trading systems and tended to discriminate against an external flow from these systems. There was, of course, a degree of contradiction in the American position, for U.S. oil companies were already engaged in the exploitation of minerals within these imperial trading systems (e.g. in the Middle East and Indonesia). Nonetheless, it became clear that the United States had begun to see the relationship between the aggressive behaviour of both Germany and Japan and their lack of access to mineral supplies. This is not to say that the United States believed that World War II was caused by the competition for access to mineral resources. But the Americans did

believe that the lack of equal access to minerals among the major industrial nations posed a threat to world peace and international cooperation.[17]

Evidence of this concern can be found in a paragraph of the Atlantic Charter, 14 August 1941, which emphasized that after the war all nations should have

> access on equal terms ... to the raw materials of the world which are needed for their economic prosperity.

Changing circumstances after the war, however, forced the United States government to qualify this principle of equal access. The intensification of conflict with the Soviet Union and China led the USA to invoke its 1917 *Trading With the Enemy Act* regarding strategic and critical minerals, among other things. Not only did the USA apply this law to its own minerals, it applied the law as well, via legal pressure on U.S. multinational corporations (MNCs), to the minerals of foreign countries where the American MNCs formed an aspect of the U.S. sphere of influence. In addition, the western powers created COCOM (the Coordination Committee) in 1949 to prevent communist access to strategic and critical materials (among other things) in the western sphere of influence. It should be noted that the Soviet Union placed a temporary embargo on exports to the West of manganese and chromium after the Berlin blockade in 1948.[18]

Some nations, such as Chile in the 1950s, found this to be an onerous policy, when confronted with domestic economic problems that clearly seemed much more urgent than a geographically remote conflict between superpowers. Nevertheless, the policy of denial of access, with some exceptions, remained in effect as originally conceived until the late 1960s when the USA, Canada, and the other NATO members (except Iceland which had never joined COCOM) began to pursue the course of detente with the communist world. COCOM presently places an embargo on a few minerals which the Eastern bloc would like to acquire (e.g. cesium). At the same time, however, the USSR is a significant supplier of chrome to the USA and oil to Western Europe. Generally, the focus of COCOM's attention is on technology rather than minerals. Canada's role in COCOM and its impact on Canadian mineral policy in foreign affairs will be discussed later.[19]

The second principle in the importing countries' perspective is that of security of supply. It has been of much longer-standing concern to European powers and Japan than to the United States:

> Western European countries outgrew their domestically produced raw materials in the last century, as their industrialization began to accelerate. Japan has been a net importer of raw materials almost from the outset of its drive toward economic modernization.[20]

How successful the policy of denial of access has been is not a matter for discussion here. Suffice it to say that the USSR and China are 'independent

resource producers', according to Connelly and Perlman, and somewhat less susceptible to pressure from blockade than the USA, and much less susceptible than either Western Europe or Japan.

The United States did not enter the ranks of net mineral importers until about 1930,[21] though American mineral MNCs had, for at least the previous 40 years, fanned out slowly but increasingly in search of new sources of supply for the domestic and, in particular, foreign markets.

Tied in with the principle of the security of supply has been the notion that supply will be more secure for the importing country if its own MNCs are directly involved in the extraction process. Whether or not the principle preceded the notion is debatable; but it does seem reasonable to conclude that the fact that an MNC from the importing country controlled and/or owned foreign mineral deposits allowed the importing country to feel more confident of the security of supply. As has been suggested, there has been a gradual bifurcation in the tie between the security of supply and the extra guarantee (whether real or psychological) provided by the MNCs' ownership and/or control. This disjuncture has not been without conflict, sometimes serious conflict.

The defence of the principle of the security of supply has not always been taken up with equal enthusiasm by the importing country and its MNCs.[22] In many cases, when an importing country's government and its MNCs act in concert because the security of supply seems to be threatened, the former may have political and/or economic reasons, other than those related to minerals, for assisting the MNCs. A good case in point is Chile under Allende. The United States is the world's largest copper producer, and its security of supply would hardly be threatened by a Marxist government in Chile that refused to sell it copper. However, this does not mean that the U.S. government would not use various inducements, sanctions and threats to guarantee a continued supply; it merely implies that its interests may not necessarily coincide with those of its MNCs, though its actions might. Moreover, attempts to link U.S. military intervention in the past with the need for foreign minerals (outside of the context of wars, of course) are spurious. American gunboat diplomacy in the 19th century and earlier in this century did not occur at a time when the USA was dependent to any significant extent on foreign minerals.[23]

The most that the U.S. government will usually do is request that prompt and adequate compensation be paid in the event of nationalization. If such compensation is not forthcoming, the U.S. government will leave the companies partly to their own devices to pursue court cases, or apply some pressure such as restricting loans through the World Bank. When events reach this stage, the problem of security of supply has been lost in the background.

In another vein, the nature of the U.S. government response may vary with the government department or agency involved. For example, in the

case of the 1974 Jamaican export tax on bauxite (to be discussed later), Revere Copper and Brass of the USA charged that the Jamaican government's change in the tax structure was equivalent to the nationalization of the company's property. OPIC (the Overseas Private Investment Corporation), the insurer, refuted Revere's claim for $90 million compensation. The U.S. Court of Appeals for the District of Columbia Circuit in February 1980 subsequently awarded the company $1.1 million in damages against OPIC.[24]

There are other factors which might dilute or undermine the unity of American government opposition to a nationalization of a foreign mineral property owned by U.S. interests. For example, New York financial houses provided loans to the Saskatchewan government during the partial nationalization of the potash industry in the mid-1970s (although the provincial government did not use the money for the purchase of the potash companies). Since the Quebec government nationalized part of the Asbestos Corporation, it has not been denied access to funds on the New York capital market. In both these instances, it is evident that the lenders are concerned, not about what a government does with respect to a mineral property, but rather about its credit rating. Both provinces have good credit ratings.

In the first 10 to 15 years after the second world war, a number of European governments fought losing battles with nationalist forces to maintain direct territorial control over their colonies (Britain in Malaysia, France in Vietnam and Algeria, and Holland in Indonesia). These efforts were inspired by a desire to maintain security of supply of raw materials, among other more important reasons. We shall discuss the more contemporary reactions of the developed importing countries to subsequent problems with the exporting countries later.

Despite the transgressions noted above, and others of a less serious nature, the importing countries are grudgingly accepting the principle of increased exporting-country ownership (public or private) and control of mineral supplies destined for their markets. There is, of course, the argument that control can still be exercised either without majority ownership or without equity at all. Thus, the importing country's MNCs' possession of technology and skills, control of markets and access to capital needed by the exporting country may temper the latter's wish to cut off or disrupt access to supplies. Likewise, a political and/or military alliance between the exporting and importing countries may obviate the problem. In effect, it is not the MNC which guarantees security of supply from an individual country, it is the exporting country. What matters most is the general climate of political and economic relations between the importing and exporting countries, the exporting country's need for revenue, and perhaps most important, the attitude of the officials and people in the exporting country towards the importing country. Where the utility of the MNC comes in is in its ability to offer the importing country a diversified array of sources of supply. This

coordination of supply patterns is what makes the MNC so valuable to the importing countries; also it is one of the reasons why the MNC is such a formidable protagonist *vis-à-vis* the exporting countries.

There is no doubt that, when the importing countries' MNCs lose majority ownership of foreign mineral supplies, the companies develop a psychological insecurity that supplies can be more easily disrupted; this sentiment is often shared by the importing countries. Further, the loss of majority ownership by the importing countries' MNCs sometimes may result in increased prices for the importing countries, since MNCs no longer have the option of intracorporate transfer pricing adjustments. Pricing policy depends on the strategic nature of the mineral in question, the exporting country's degree of monopoly of world production and exports, and swings in market demand.

The development of greater ownership by the government or private firms in the mineral-exporting countries, and more particularly, joint attempts by mineral-exporting countries to raise prices, have led to the evolution of the third principle governing the importing countries' perspective: the principle of equitable prices. Equitable prices are probably best described as competitive prices. When exporting countries use supply management to raise prices deliberately, either alone or in concert with other exporters, importing countries usually raise objections. Prices which do not fall when demand falls are detrimental to economic growth and the maintenance of international competitiveness in the importing country. The stress on equitable prices lies at the base of the opposition of importing countries to mineral cartels, and to supply management by exporting countries designed to raise prices above market trends.

Bergsten, Horst and Moran,[25] following the earlier position of Hirschman,[26] argue that direct investment by a MNC of an importing country in a mineral exporting country is a source of antagonism between both countries, as well as a disruptive factor in mineral makets. Thus they suggest that the MNCs should offer their services (management, marketing, technical etc.) to the exporting countries by contract in the future and avoid taking equity in mining projects. This begs the question of whether or not consortia of banks, suppliers and international institutions such as the World Bank, which are playing a growing role in financing mineral projects in less developed countries, will agree to do so without the MNC having some stake in the equity of the project. In this light it does appear that Jordan and Kilmarx are correct in stating that:

> limited equity participation combined with multilateral loans may prove to be the only way to finance many projects in the future.[27]

Of course, this perspective is generally concerned with investment problems in the LDCs. Wholesale nationalization as a dominant aspect of political ideology is not likely to become the wave of the future in the developed mineral exporting countries like Canada, Australia, South Africa

and the United States, where an increasingly dominant proportion of OECD mineral investment was channeled in the 1970s. This is not to suggest that these countries will not raise their taxes or even nationalize the odd company. Rather it suggests that these 'independents' have a different approach to mineral development and foreign relations than do the LDCs.

In instances where all three principles (access, security and equitable prices) are to some degree under threat at the same time, as is the case with petroleum, severe problems may be posed for the importing countries. Connelly and Perlman point out that:

> until recently, the historical experience of the industrial nations has generally been that the unrestricted supply and stable price of raw materials have acted as engines of domestic and international development rather than as constraints. As and when this picture changes, the industrial nations may simultaneously face strains in internal economic growth and international clashes of economic interest. Both will place severe demands on domestic social cohesion and expectations.[28]

So far these cases have not been numerous, with oil towering over the others (such as copper, bauxite, mercury and phosphate, etc.).

In conclusion, we observe that the importing countries' principles of equal access, security of supply, and equitable prices have become part of their national security perspective. In response to this development, as well as to previous historical grievances, domestic power struggles, and the asymmetry of power and need among the exporting and importing countries and the MNCs, the exporting countries have often cloaked the principles of their ownership and control of domestic minerals within a national security perspective. Of interest here is that the importing country creates an aura of national security around its needs (minerals), while the exporting country creates the same aura around its advantages (minerals). This testifies to the political importance of minerals in international trade.

Minerals in International Trade

The most dramatic consequence of the trends during the twentieth century affecting the relations of mineral importing and exporting countries has been the decision of MNCs to invest the majority of their funds in mining projects in developed countries. This pattern of investment is reflected in table 1 which illustrates the dominant role that developed countries still play in exports of nonenergy metals and minerals, despite the evident resource potential in the Third World (see appendix II). By the same token, the efforts by various mining consortia to effect cheap, practical processes to mine ferromanganese nodules on the ocean floor (discussed further, later in this chapter) is largely attributable to the actual or feared lack of reliability and stability of many governments in the Third World, or in other countries such as South Africa.

Despite the growing awareness of the importance of minerals in world

politics and economics, it may be surprising to learn what a relatively small role minerals play in total world exports. As we can see in table 1, in 1970 nonferrous metals accounted for only 4 percent of the value of total world exports; by 1976 this percentage had dropped to 2.2 percent. Similarly, there have been declines for (a) crude fertilizers, metalliferous ores and metal scrap

TABLE 1

World Exports by Classes and Areas, 1970 and 1976
(percent of total value - f.o.b. price)

Classes		World	Developed Market Countries	Developing Countries	Socialist Countries of Eastern Europe including USSR	Socialist Countries of Asia including China
Total	1970	100	71.8	17.6	9.7	0.75
	1976	100	64.9	25.7	8.5	0.80
All food items	1970	15.0	59.0	31.7	7.4	1.7
	1976	12.7	61.6	30.9	5.3	2.0
Agricultural raw materials	1970	5.9	58.4	30.7	9.6	1.6
	1976	4.3	61.5	27.0	9.7	1.7
Crude fertilizers, metalliferous ores, metal scrap	1970	3.4	58.4	30.7	9.9	0.87
	1976	2.2	56.6	30.5	11.6	1.1
Fuels, lubricants and related materials	1970	9.3	26.5	63.1	10.2	0.08
	1976	20.4	16.1	75.2	8.2	0.39
Chemical products	1970	7.1	88.9	3.9	6.5	0.52
	1976	7.0	88.1	5.3	5.9	0.50
Iron and steel	1970	5.5	82.5	3.3	13.6	0.44
	1976	4.5	84.5	3.9	11.0	0.47
Nonferrous metals	1970	4.0	63.5	28.9	7.1	0.37
	1976	2.2	66.8	24.5	7.8	0.75
Machinery and transport equipment	1970	29.3	87.6	1.6	10.7	0.08
	1976	28.6	86.9	3.4	9.6	0.06
Other manufactured goods	1970	20.1	79.9	11.1	7.5	1.4
	1976	17.7	76.4	15.6	6.3	1.5

Source: UNCTAD, 1979, *Handbook of International Trade and Development Statistics*, Geneva, Tables A-1 through A-10 (adapted). Because of errors of addition by UNCTAD, world totals had to be adjusted to reflect regional and class totals prior to conversion to percentages.

exports and (b) iron and steel exports. If these three categories of metallic and nonmetallic minerals are added together, we find that in 1970 they accounted for 12.9 percent of world exports and only 8.9 percent in 1976.

There are a number of reasons for this decline. First, the value of fuels, lubricants and related exports jumped from 9.3 percent of world totals in 1970 to 20.4 percent in 1976. This would seem to be the most important reason for the decline of metallic and nonmetallic minerals' share of world trade, since no other category of exports increased its share. Other possible, but minor, reasons for the decline of nonfuel minerals in world exports would involve recycling, substitution, economizing on mineral imports (e.g. through the use of super-alloys), and declining import consumption in some major importing countries due to the growth of service industries.

Table 1 takes on a different significance when we look at other factors. Clearly, the developed market economies dominate world exports in iron and steel (84.5 percent in 1976), crude fertilizers, metalliferous ores and metal scrap (56.6 percent in 1976) and nonferrous metals (66.8 percent in 1976). In the case of iron and steel, the percent share of world exports of the developed market economies has increased from 1970 to 1976 at the expense of the Soviet bloc. In exports of crude fertilizers, metalliferous ores, and metal scrap, the share of the developed market economies declined from 1970 to 1976 due to increased exports of the Soviet bloc. However, for nonferrous metal exports the share of the developed market economies increased at the expense of the developing countries. We shall discuss this matter in detail later. Despite the decline in their share of nonferrous metal exports, the developing countries still accounted for 24.5 percent of world exports in 1976, a substantial amount. They also accounted for 30.5 percent of world exports of crude fertilizers, metalliferous ores and metal scrap, a figure relatively unchanged since 1970.

Since the developed market economies account for such a large share of world trade in metallic and nonmetallic minerals, it will not be surprising to discover that Canada plays a major role in world exports of some minerals. Overall, Canada's share of total world mineral exports has been stable over the last decade. We shall discuss the role of Canada in detail in chapter 3. Now we shall analyze several of the most important actions that mineral exporting countries have taken to further their interests.

Producer Association Activity

OPEC was formed in 1960, followed 7 years later in 1967 by CIPEC, for copper. However, it was not until the OPEC price hike of 1973 that nonfuel mineral producers were inspired to attempt similar action. The minerals involved in association action were bauxite, iron ore, phosphate, copper and mercury. The organization of and action by uranium producers preceded the OPEC price rise in 1973. Attempts to form a silver producers' association have not met

with success to date. Periodically, there are press reports of futile efforts to form a Council of Producer Organizations. For example, in August 1977, 'eight producer associations representing the sugar, banana, bauxite, cocoa, coconut, natural rubber, iron ore and oil industries...' held a meeting to discuss joint cooperation. The copper producers' association, CIPEC, did not send a representative.[29]

Producer associations such as OPEC and the uranium cartel have the goals of controlling the price, production and markets for a particular commodity. Other producer associations have more modest objectives. For example, the founding objectives of CIPEC were as follows:

> the co-ordination and proposal of individual and joint measures in relation to the international copper market, production processes, the expansion of consumption and any other measure that is designed to obtain legitimate increased revenues derived from copper exports for member countries.[30]

Additional goals usually involve stabilizing market prices, maintaining prices above cost, encouraging the export of more highly processed minerals, and countering the market dominance of existing MNCs.[31] As table 2 illustrates in detail, only OPEC and UMRO (uranium) have the necessary requisites to engage in sustained cartel activity. IBA (bauxite), WPRI (phosphates) and IAMP (mercury) have enjoyed modest success, while CIPEC (copper) and APEF (iron ore) have drawn a blank.

There is an important time factor that bears on the success or failure of a producer association. According to Johnson,

> the demand for most mineral commodities is quite insensitive to price changes in the short term (less than one year). However, demand is usually relatively responsive in the opposite direction to price changes in the longer term (three to five years).[32]

What this means is that, unless the consumer can reach into a stockpile, recycle, consume less, buy a substitute, or purchase from an alternate seller who is willing to sell for less, he must pay the price asked in the short run. In the longer run, new mines can be developed and greater efficiency can be applied to substitution, conservation and recycling. If a producer association can meet all the requisites noted in table 2, it has a good chance of surviving beyond the critical 5-year period. If the requisites can only be met in part, the producer group can still engage in successful cartel activity but the duration of such behaviour is likely to be short, perhaps even less than a year. So far only OPEC has survived unscathed for over 5 years, although the uranium group has the potential to do so if it wishes. We now turn to a brief discussion of the partially successful attempts by the producers of phosphates, mercury and bauxite.

In 1973, 3 weeks after the OPEC price rise, Morocco and other North African phosphate producers began to push up the price of phosphate. By mid-1974 the price had climbed from $12 per ton to $68 per ton.[33] Given

available information, it appears that the North African producers had capitalized on production cutbacks by U.S. producers in Florida. However, there is strong suspicion that the longevity of the price rise was due to collusion by the U.S. producers.[34] In any case, from the beginning of the intervention until mid-1974, Morocco earned about $1 billion from phosphate exports, a substantial increase in earnings.[35] Consumer resistance, however, soon set in and gradually the U.S. producers undercut the cartel price.[36] By 1976 the phosphate price had fallen to levels 'that hardly reflect the rate of inflation in the past few years.'[37]

One consequence of this cartel move was a concerted effort by consumers to generate new sources of phosphate supply.[38] These supplies are now coming on stream and are expected to create an oversupply situation in the 1980s. The North African producers have been saddled with the image of being unreliable suppliers.[39] Further, it is possible that Morocco's participation in the cartel contributed to the original U.S. decision not to support Morocco's occupation of the Spanish Sahara, which has large deposits of phosphates. In conclusion, although the phosphate cartel lasted for about 2 years (being more effective in the first year than in the second), its actions triggered a reaction that has undermined its ability to carry out similar efforts in the future.

In 1974, prior to adopting the name International Association of Mercury Producers (IAMP), the mercury producers were able to double the price per flask of mercury to $350. The methods used were production cutbacks and stockpiling. But this price held only for a few months and soon dropped to more normal levels of $160-$175 per flask. The main reasons for the cartel failure were the lack of policy coordination, oversupply, and consumer resistance. Since then, taking advantage of declining investment in new mine capacity, the mercury producers have had better luck. In 1977 the average price of mercury was $135.71 (U.S.) per flask. By 1981 the price had risen to $410.00, an increase of 202 percent. The average price in 1982 was $371.00. This increase in price has been achieved only because of apparently coordinated export restrictions by producers in Italy, Spain, Algeria and the USSR.[41] That this development has taken place despite significant sales from the U.S. stockpile in 1981, and despite declining demand, suggests strongly that mercury producers have now mounted an effective cartel operation.

Mercury demand for the rest of the decade is expected to decrease at a rate of 1 percent per annum, largely due to environmental concerns. World mercury production, which has been stable since 1978 (190,000 flasks in 1981), has shown a dramatic decline since the 1965 high point of 276,000 flasks.[42] How long this cartel action can endure remains to be seen. Effective

TABLE 2

Cartel Attempts and Results
(by producer groups and mineral)

Requisite Factors	OPEC Oil	CIPEC Copper	APEF Iron ore
Large % of production, and exports (about 2/3)	Yes (63%)	Partial (60%)[b]	No (48%)
Demand changes little in response to big changes in price (low price elasticity of demand)	Yes	No	Partial[c]
Supply available outside the cartel is small given the change in price (low price elasticity of supply)	Yes	No	No
Little or no recycling	Yes	No	No
Substitution is more expensive and a long-term proposition	Yes	No	Partial[d]
Agreement of cartel members on production and price plans	Yes[a]	No	No
Strong financial reserves (e.g. for stockpiling and paying for imports)	Yes	No	No
Restrictions on the rate of production have only minor effects on employment levels	Yes	No	No
Canada's % of world production (1981 estimates)	n.a.	8.8	5.7

[a] By 1982 OPEC's discipline had begun to weaken. Iran, Libya and Nigeria were producing considerably over allocated quotas and selling under the fixed price.
[b] CIPEC controls about 60% of world copper exports but only about 20% of world production.
[c] While iron ore is absolutely essential to the growth of most economic sectors, the price tends to be controlled by vertical integration or long term contracts.
[d] While there is no substitute for iron ore there are several for steel (e.g. aluminum, plastics, glass, concrete).

TABLE 2 (continued)

Cartel Attempts and Results
(by producer groups and mineral)

IBA Bauxite	WPRI Phosphate	IAMP Mercury	UMRO Uranium
Yes (82%)	Yes	Yes	Yes (90%)
Partial[e]	Partial[f]	Partial	Yes
Partial	Partial[j]	No	Yes
No	Partial[k]	Yes	Yes
Partial[f]	Yes	Partial[n]	Yes
No[g]	Partial[j]	Yes	Yes[o]
No[h]	Partial[l]	Yes	Yes
No[h]	Partial[l]	Yes	Yes
0	0	0	17.8

[e] The price of bauxite is only a small percentage of the final price of alvminum. The price of the energy used in the conversion of bauxite to aluminum is greater than the price of bauxite.
[f] Pilot projects utilizing alluvial clays and anorthosite have been developed in France and the USA.
[g] Australia follows an independent policy but has supported some increase in price.
[h] Only Australia.
[i] Only for a short time.
[j] This largely depends on whether or not American producers are willing to support the aims of other producers.
[k] Only for minor uses.
[l] Only the U.S. producers.
[m] While there are few satisfactory substitutes for the present uses of mercury, some alternatives are available. However, severe environmental pollution and health hazards posed by mercury limit its growth potential.
[n] By mutual consent the agreement has lapsed.

price-raising action began in 1979. Two points are worth noting here: first, the Soviet Union is apparently coordinating supply management and pricing policy with the cartel; second, the consumer resistance facing mercury because of environmental concerns appears to be similar to the state of affairs confronting asbestos.

The case of bauxite is different from those of mercury and phosphate, and begs a more thorough investigation. In June 1974, Jamaica, the world's second largest producer after Australia, acting on its own, pegged the export levy on bauxite (7.5 percent) to the market price of aluminum ingots – a form of indexation. In effect, the tax levy was raised 600 percent over the previous level. As a result, Jamaica's bauxite tax revenues jumped from $24.5 million in 1973 to $126.5 million, an increase of some 500 percent. The new Jamaican levy of $15 per short ton of bauxite was followed by almost all the other members of the International Bauxite Association, but not with equal enthusiasm. Thus, while Haiti, Guyana and the Dominican Republic also imposed a levy of $15 per ton, Surinam raised its tax only to $11, and Guinea only to $6.55.

Australia did not change its tax level at all.[43] Australia saw the tax increase by IBA members as an opportunity to increase its own share of the U.S. market. In contrast to bauxite from the Carribbean which entered the U.S. market after the export levy and which shipping costs ranging from $1.60 to $6.00 per tonne, Australia's costs stayed at $11.00 per tonne.[44] Thus, by holding to its former price, Australia was bound to expand its share of the U.S. market. Another reason for Australia's lack of cooperation with the IBA members lies in its foreign policy concerns related to minerals. While it seems that Australia will not shrink from taking some advantage of its power to maintain high prices where possible,[45] its policy is directed towards the exchange of information with other producing countries, and towards the avoidance of cartelization of a mineral industry where Australia has some strength. On this latter point, John Rose, a commodity advisor to the Australian government, has emphasized that:

> such a policy (support for a cartel) would be in outright conflict with our goal of attracting a high level of investment and an inflow of capital to mineral projects in Australia.[46]

Guinea's Boke bauxite project was just beginning in 1976, and so Guinea too hoped to capture more markets. Moreover, its product cost per tonne was $11, nearly double that of the other producers, so a tax increase would have made its product less competitive. We shall discuss the results of these tax increases in a moment. First, however, we must analyse why the circumstances were ripe for IBA action.[47]

According to a study by the U.S. General Accounting Office, the favourable circumstances included shortages of alumnia and aluminum, and an unexpected increase in demand, all of which were characteristic of the

commodities boom. Next, the seemingly dramatic tax rise is put into better perspective when we compare the importance of the value of bauxite with the values of higher stages of production: the ratio of the values of alumina, aluminum and semifabricated aluminum to raw bauxite are respectively 4, 15, and 33.[48] A major reason for the differentiation of these values is the cost of energy at the higher stages of production. For example, it takes 20,000 kilowatt hours to produce one ton of aluminum from alumnia.[49] Thus, a large increase in the price of bauxite (e.g. through an export tax) may have only a small impact on the price of the final product. Landsberg reports that:

> the increase in Jamaica's levy on bauxite made a difference of only about 2¢ or 3¢ - or less than 10 percent - in the price of aluminum ingots, let alone the finished aluminum product.[50]

Nevertheless, the combined MA bauxite increases cost importers in the United States an additional $200 million in 1974.[51] The aluminum companies passed this increase on to final consumers, for several reasons.[52] They had large 'sunk costs' in the bauxite-exporting countries; for example, American and Canadian companies had between $800 million and $1 billion invested in Jamaica; thus, they could not, in the short run at least, simply build new installations elsewhere. More importantly, the quality of bauxite varies considerably from country to country, and the alumina refineries in the importing countries are geared specifically to these grades. Conversion of equipment to adapt to alternate bauxite grades takes time and money.

Substitution of plentiful bauxite alternatives such as anorthosite, alluvial clays, dawsonite or alunite also requires certain considerations to be met. First, the price of bauxite has to rise to and stay between $24.26 and $35.56 per short ton ($26.72 to $39.19 per tonne) in order to call forth the necessary investment.[53] In 1976 the cost of Caribbean bauxite in the USA ranged from $19 to $27 per short ton. Since then the price of bauxite has stayed well under the substitution-trigger price range. Second, in 1978 Aluminium Pechiney (France) and Alcan (Canada) announced that they had completed a successful 2-year joint pilot project for making alumina from bauxite substitutes.[54] However, for the short run at least, there are still some technical problems inhibiting the creation of full-scale bauxite substitute plants. Thus bauxite will likely continue to be the primary source for aluminum in the near future.

There is, in addition, possibly one other factor which may act as a constraint on substitution. The aluminum companies may fear that competition from other companies in the development of bauxite substitutes could erode their market power.[55] Thus, it would appear that the aluminum companies and the bauxite exporters have a mutual interest in restraining price increases for bauxite.

In sum, the companies had no choice but to pass on the higher costs to consumers in 1974 and 1976 (there was no price increase in 1975 due to the recession). But in the interim they were fortifying their position, by making

efforts to encourage the exporters to restrain prices, and by beginning to diversify sources of supply. Jamaica bore the brunt of these changes but did not lose everything it had gained.

Prior to 1974 Jamaican bauxite had a $2-$3 cost advantage in the U.S. market over its competitors, largely due to geographical proximity. After 1974 this advantage disappeared due to the bauxite levy. Moreover, some of the companies began to diversify their production facilities away from the Caribbean product to that of Guinea, Brazil and Australia. For example, Alcoa acquired 84 percent of its bauxite/alumina in the Caribbean in 1972, 70 percent in 1974 and 38 percent in 1976. Alcan reduced production in Jamaica by an estimated 25 percent. From 1974 to 1976 world bauxite production dropped by 8 percent, while production in Jamaica and Surinam fell by over 30 percent.[56] Jamaica was faced with additional problems as well:[57]

i an increase in the cost of its oil imports from $42 million in 1972 to $880 million in 1979;
ii 30 percent unemployment;
iii inflation over 35 percent per annum;
iv emigration of skilled personnel;
v seven consecutive years of negative GNP growth (1978 rate: −1.7 percent);
vi general problems including strikes and inefficiency;
vii failure to reach agreement with Mexico and Venezuela for a tripartite aluminum refinery.[58]

The combination of these bauxite-related and domestic problems led Jamaica to renegotiate its bauxite export levy with the aluminum companies in 1979. For the latter part of 1979 the levy was reduced from 8 percent of the aluminum ingot price to 7 percent; further, Jamaica committed itself to reduce the levy to between 5 and 6 percent by 1983.[59] But even at that level the bauxite tax is still well above the 1973 rate, and thus the IBA price increase for bauxite exports must be considered a partial success. Moreover, it is the impression of informed observers that, if Australia coordinated its price and production policies with the other IBA members, the producer association could operate successfully beyond its present scope.[60] However, Pindyck argues that if Australia left the IBA, 'it could nearly double its profits.'[61] But this would likely lead to a costly price war. Finally, IBA members must be somewhat concerned about the increase in capacity outside the IBA and the lower capacity utilization rates among many IBA members which their exercise in resource diplomacy encouraged.

Our three examples, phosphate, mercury and bauxite, offer different illustrations of the longevity of nonfuel mineral cartel operations. These three examples also reveal the problems that arise when a producer group does not have the requisites for cartel behaviour but attempts to act like one. Each

case is different, and all pale beside the success of OPEC. Of greatest importance here is the realization that participation in a cartel can bring both benefits (e.g. increased foreign exchange earnings) and costs (e.g. loss of markets through substitution or because customers have switched to alternate sources of supplies). On the other hand, unilateral action can be just as dangerous, as the following example indicates:

> ...at one time India was a major source of world manganese supply. In view of its strong position, it imposed an export tariff to increase revenue from exports. Exploration in other countries soon discovered plentiful reserves that were more economical than those in India. Currently, India is no longer a significant exporter of manganese.[62]

International Commodity Agreements

International commodity agreements (ICAs) are associations of countries engaged in importing and exporting of certain raw or partly processed materials. Such agreements have several key goals. Both sides seek to stabilize the price of the commodity in question through the use of buffer stocks (stockpiles) and/or supply management (i.e. controls on production and/or exports). However, as Fargey has noted:

> absolute price stability is not possible in an inflationary world since prices must increase to ensure future supply.

ICAs seek to maintain the price of the commodity within an agreed range (or band width). The larger the price spread to be defended, the smaller the buffer stock needed; the smaller the price spread, the larger the buffer stock required. It has been the practice in the past for producers to finance the buffer stock, while consumers usually made voluntary contributions. This state of affairs may be changing, as we shall note later.

The buffer stock manager is usually authorized to buy the commodity when its price falls below an agreed level (usually the floor price, but perhaps at a price somewhere between the bottom of the middle price range and the floor price). On the other hand, he is authorized to sell the commodity when it reaches an agreed upper level (the ceiling) or when the price approaches that level. Production and/or export quotas are normally implemented during depressed markets in order to keep the price from falling below the floor. Quotas are usually based on the average production of each exporting country for a period of 3 or 4 years prior to the point of implementation.

While producing countries start off with price stability as their preeminent goal, their eventual priority in participating in international commodity agreements is the improvement of real income.[64] While the primary goal of the importing countries is price stability, they also hope to receive some guarantee of security of supply and access to supplies, particularly in periods of shortages.

In essence, the creation of international commodity agreements has been viewed by participants as an attempt to regulate, to some extent, the international market, when the 'free' market was considered to produce results that were unacceptable to both producing and consuming countries. Participation by exporting countries in an ICA may be seen by them as an effort to strengthen the country through cooperation. This, in fact, is true. But such participation also signifies a certain loss of sovereign control due to the internationalization of decision making which characterizes ICAs. On the other hand, importing countries, because of the weaknesses inherent in resource deficiency, seek to improve their position by cooperating with exporting countries and participating in the decisions that affect the flow and prices of commodities.

The creation of international commodity agreements between exporting and importing countries is a relatively recent phenomenon. There were several important factors behind the emergence of, and interest in, ICAs following the end of World War II. There was considerable concern expressed by the USA and Britain that ways be found to facilitate the expansion of world trade. Shortages for many commodities arose in the immediate aftermath of World War II, thus capturing the interest of consuming nations in ICAs. This was followed by surpluses, or fears of surpluses, just prior to the Korean War, which brought support from producing nations for ICAs. Again, with the commodities price boom and the shortages of commodities during the Korean War, consuming countries expressed more interest in ICAs.[65] In other words, in periods of excess production exporting nations have tended to favour ICAs, while in periods of shortages importing countries have pronounced a faith in ICAs. Sometimes the interests of both exporting and importing countries have tended to coincide, resulting in the creation of ICAs, while at other times agreements have been unreachable.

The initial enthusiasm for ICAs helped to bring about the Havana Conference of 1947 and an unsuccessful effort to create an international trade organization which, among other things, was to supervise the negotiation and implementation of ICAs and study groups of producers and consumers. However, what did emerge was a declaration of principles which included for the first time the notion that both producing and consuming countries should be represented equally in any ICA.[66] This innovation was a reaction to the emergence of a number of producer cartels between the first and second world wars.[67] The focus of attention of this significant development in producer-consumer relations was placed first on agricultural commodities such as tea, cotton, wool, wheat, sugar and rubber. Where agreements on ICAs could not be reached, study groups were set up to exchange data on production and consumption. The first mineral to become the subject of a study group was tin, in 1947, although it was not until 1956 that both exporting and importing countries could agree on setting up an international

commodity agreement for tin.

With the termination of the old colonial empires in the 1940s, 1950s and 1960s, and the birth of many new but economically less developed nations which produced and exported raw materials, the ranks of those supporting ICAs grew. There are numerous reasons behind the LDCs' support for ICAs. These include concern with the consequences of cyclical price volatility; dissatisfaction with foreign aid; frustration with the failure of the developed countries to make major concessions for access to markets; anger over the perceived and/or real deterioration of the terms of trade for their commodity exports; failure by some exporting countries to duplicate the success of the OPEC producers cartel; and finally, the perception by the LDCs that there is strength in numbers and in organization. In this latter respect the LDCs have chosen to work through UNCTAD (United Nations Conference on Trade and Development), which, since its inception in 1964, has been promoting the creation of ICAs.[68]

Canada's basic foreign policy principle for minerals, of treating each mineral on a case-by-case basis, runs counter to the attempt by the Group of 77 in UNCTAD to achieve a major renovation of international markets for commodities by linking the fate of 18 specified commodities, including 6 minerals: copper, tin, bauxite, iron ore, manganese and phosphate. The linkage is to be accomplished through the Integrated Programme for Commodities, and includes, in addition to the 6 minerals: coffee, cocoa, tea, sugar, cotton, rubber, jute, sisal, bananas, beef, tropical lumber, vegetable oil and oil seeds. Canada is a large producer of iron ore and copper, a small by-product producer of tin, and a major consumer of bauxite which it turns into aluminum. Canada is also an importer of manganese and phosphates.

The Group of 77 proposal was adopted on May 31 by UNCTAD (resolution 93:iv) at its 1976 conference in Nairobi. On 1 June 1977, the developing and developed countries (including Canada) participating in the Conference of International Economic Cooperation in Paris (sometimes referred to as the North/South dialogue) unanimously accepted the 'principle' that a Common Fund to finance the stabilization of the prices of the 18 commodities be established, provided that ICAs could be negotiated for each particular commodity. Tied to the goal of price stabilization, which aims at moderating inflation and the swings in commodity cycles, are those of improving the terms of trade of LDC commodity exports, stabilizing and increasing employment, and helping the LDCs to pay off their debts. Other goals of the UNCTAD program envision the transfer of technology and of research and development facilities from developed countries to the LDCs, improvement of market access in the developed country markets, diversification of production in and exports from the LDCs, and improvements in and greater LDC control of the marketing, distribution and transportation of these 18 commodities.

On 15 January 1981, Canada signed an international agreement to

TABLE 3

Perceptions of the Common Fund

Group of 77's Original Position	Developed Countries' Original Position	Canada's Original Position
Voting control based on numbers: more LDCs = LDC control	Voting control based on financial contributions	There should be no dominant groups
Common fund to provide most of the financing for individual commodity agreements. DCs to provide 70% of the money for the Common Fund	Producer and consumer countries of each commodity to provide 75% in cash, the rest in loans for a buffer stock for that particular commodity. The Common Fund would supplement the buffer stock funds of individual commodities when necessary.	Same as DCs
Common Fund must have provisions for financing diversification of LDC production and exports, increasing productivity, market promotion, research & development	Common Fund must only be used for buffer stock arrangements; however, an aid window financed by voluntary contributions to, and profits made by, the Common Fund might be acceptable	Same as DCs
Size of Common Fund: $6 billion	Size depends on the number of commodity agreements which have been concluded by producers and consumers. LDCs and DCs have now agreed to start the Common Fund with $750 million)	Same as DCs
Loan-equity ratio of 2:1	Each commodity agreement can borrow up to 25% of their needs for operating the buffer stock.	Same as DCs
Common Fund would have no right to interfere in the market	Same	Same
Financing for bigger stocks and any other purpose such as diversification must be kept separate	Same	Same

TABLE 3 (continued)

Perceptions of the Common Fund

Group of 77 Original Position	Developed Countries' Original Position	Canada's Original Position
Common Fund must pay its own way once started; i.e. it is expected to make a profit	Same	Same
Compensatory financing for fluctuations in export earnings is important but secondary to the Common Fund	The reverse is true	Same as DCs
Establishment of negotiated price ranges for individual commodities to be revised according to movements in prices of imported manufactured goods, exchange rates, production costs and world inflation, and levels of production and consumption	No	No
Stabilizing of prices around a growing trend	Yes, but only if it reflects market trends	Same as DCs
Export quotas when necessary	Yes (no for USA where there is U.S. production)	Yes
Long-term supply purchase commitments (where appropriate)	Yes	Yes
Information sharing and consultation	Yes	Yes

[a] Includes 114 less developed countries.

establish the 'Common Fund for Commodities.' The fund, consisting of $750 million (U.S.), will come into effect when 90 countries have ratified the agreement. $400 million will be used to stabilize commodity prices through the financing of buffer stocks set up and managed by existing international commodity agreements. It is expected that Canada will contribute $10.38 million to commodity price stabilization and another $12 million to the second account or window which will be used to finance commodity-related research

and development projects, productivity improvements, and marketing.[69] Since our purpose in this book is to focus on minerals, it is neither practical nor desirable to include here a detailed discussion of Canada's reaction to the Common Fund and the Integrated Programme for Commodities. Table 3 illustrates that Canada's original position coincided more closely with that of the developed countries than that of the LDCs. It is worth examining several important factors which clarify Canada's perspective.

The importance given to minerals by LDC policy makers should be greater than that in Canada, considering the greater importance of minerals in their economies. For example, mineral production represents 25 percent or more of gross domestic product in Bolivia, Gabon, Liberia, Mauritania, Surinam and Zambia and 10 percent or more in Chile, Guinea, Guyana, Indonesia, Jamaica, Mexico, Sierra Leone and Zaire. In Canada production of iron and steel, structural mineral products and metallic and nonmetallic minerals represented only 4.7 percent of gross domestic product in 1978.[70] The value of the major minerals exported from many LDC producers usually represents 60 percent or more of the value of total exports. For example:

- Zambia, copper, 95 percent;
- Mauritania, iron ore, 87 percent;
- Surinam, bauxite-alumina, 87 percent;
- Chile, copper, 78 percent;
- Bolivia, tin, 75 percent;
- Liberia, iron ore, 72 percent;
- Sierra Leone, diamonds, 69 percent;
- Zaire, copper, 67 percent.

In 1977 iron ore and concentrates plus steel exports represented only 4.92 percent of the total value of Canada's exports; nickel ores, concentrates and refined metal only 2.31 percent. Other Canadian mineral exports were much less, often less than 1 percent of total export value. In 1979, the value of all (some 60 or so) nonfuel mineral exports from Canada represented 16.9 percent of the value of total exports.

Even if we look at the role of minerals in Canada's provincial economies, by and large, we would come to the same conclusion. In table 4 we note that, where minerals make up a significant part of the gross provincial product (GPP), this is because of oil, coal and gas (Alberta), or a combination of oil and potash (Saskatchewan). The only exception appears to be Newfoundland[71] which, however, is at the beginning of a boom in oil production. Further, the major nonfuel mineral producing provinces, Ontario and Quebec, have witnessed little change in the share of minerals in their GPP because of the dominance of the manufacturing sector and the growth of the service sector.

In table 4 we can discern that the governments of Newfoundland and British Columbia[72] would be most concerned with the development of nonfuel

minerals within their borders during recessions and in times of prosperity. In general, however, we can see that the intensity of government interest in minerals would be less in Canada than in the mineral-exporting countries of the less developed world. There are other differences as well. Canada is better able to absorb the social and economic consequences of large production cut-backs, because of unemployment insurance, welfare, job retraining, and the availability of alternate sources of employment. Further, the 'terms of trade' experience of less developed countries and Canada are noticeably different:

> Canada did not experience 'secular deterioration' in its terms of trade from the early 1950s to the early 1970s. After 1973, both the LDCs in aggregate and Canada experienced improved terms of trade, although for the LDCs the gainers were largely oil exporting countries [plus phosphate exporters and, briefly, sugar exporters].[73]

TABLE 4

Mineral Production (Including Oil and Gas) by Province , 1972 and 1979 (as percent of gross provincial product)

Province	1979	1972
Newfoundland	34.7	20.2
Prince Edward Island	0.3	0.3
Nova Scotia	3.6	2.1
New Brunswick	11.3	6.3
Quebec	4.1	3.1
Ontario	3.6	3.6
Manitoba	6.3	7.2
Saskatchewan	18.8	14.2[b]
Alberta	44.5	24.0
British Columbia	9.7	5.7
Yukon	n.a.	n.a.
Northwest Territories	n.a.	n.a.

Source: The Mining Association of Canada, *Facts and Figures* (selected years)

Note: n.a. = not available.

[a] The oil and gas producers in Canada are Alberta, British Columbia and Saskatchewan.
[b] Data for 1974.

Behrman compared the secular trends in deflated prices for various commodities in two periods, 1953-72, and 1950-75.[74] His conclusions show that the inclusion of the booms during the Korean War and the early to mid-1970s do not bias the outcome. In general, the terms of trade for minerals have fared better than those for agricultural commodities. The trend has been positive for bauxite, neutral for copper and tin, and negative for zinc, lead and iron ore.[75] It is possible that the trend in the terms of trade for iron ore is negative over the period because the steel companies which usually own the iron mines have kept prices low in order to meet competition. The negative trend in the terms of trade for iron ore might be an inducement for Canada

to consider an ICA for that mineral. It may be that similar conclusions could be drawn for lead and zinc.

Of course, Canada does share some interests with less developed countries. For instance, it has similar if less intensive concerns about foreign ownership. As we saw earlier, the increase in exploration for minerals in Canada gives this country somewhat greater motivation for concern over foreign investment and somewhat more sympathy for LDC problems. However, a number of large Canadian-owned or controlled mining companies have projects in the Third World. Another area of similar interest involves the upgrading of mineral ores prior to export. However, Canada is as likely as not to be competing with LDCs for the development of mines and processing facilities. In general, we can conclude here that differences between Canadian policy on ICAs and those of the LDCs largely reflect differences in background factors such as the degree of importance of minerals in gross domestic product and exports, as well as in the terms of trade for minerals encountered by each.

There are more common points of interest with the LDCs: for example, cyclical volatility of mineral prices. Cyclical volatility can be defined as strong fluctuations in the price of a commodity due to an inability by producers and consumers to maintain a smooth, moving balance betweeen supply and demand. The causes of cyclical instability for mineral prices are many.[76] First, mining requires lengthy periods of time for exploration and development of new mineral deposits; production usually follows sometime between 4 and 12 years after the start of exploration. This slow response of supply to demand in the short run (low short-run price elasticity of supply) means that large price increases can occur in the short run before new supplies are available.

Second, changes in the price usually do not affect demand in the short run (low short-run price elasticity of demand) because the cost of mineral inputs generally represents only a small percent of the cost of the final product; further, substitution normally cannot be undertaken in the short run because of the need to order new equipment, retool existing equipment, and retrain workers. Because of the first two factors, small changes in supply and/or demand can result in sharp fluctuations in price.[77]

Third, the level of demand fluctuates with the business cycle:

> there has been a steady shift in the final composition of demand in the major economies of the world. Primary and secondary industries have declined in relation to tertiary industries. As a result, the impact of even modest cyclical variations in aggregate demand on industrial markets has been increasing.[78]

The impact of the business cycle may become significantly greater if the business cycles of the major market economies become synchronized, as they have been on occasion during the past decade (high short-run elasticity of demand with respect to income). Fourth, fabricators who are concerned about security of supply may buy heavily during sustained price rises, thus

exaggerating the price spiral, and sit on their sometimes large inventories at the end of price downturns, thus checking normal tendencies for the price to rise. Fifth, independent speculators who are neither producers nor consumers may distort markets by waiting out trends in the market before selling (when the price is rising) or buying when the price is falling. Sixth, the activities of government-run stockpiles may distort normal market trends. The only major government stockpiling in the past has been in the USA, but other governments are now entering the field. U.S. government stockpile purchases and disposals can sometimes exaggerate trends, although this has not been the case in the past for tin. Finally, other factors such as wars, revolution, strikes and cartel operations may also create similar market disturbances.

There are numerous problems in negotiating international commodity agreements due to contentious issues between producers and consumers, and among producers themselves both within and between countries. Producers and consumers may disagree on factors such as: who is to finance how much of the buffer stock; how big the buffer stock should be; whether or not there should be export and production controls; how to share the profits and losses of the buffer stock operations; how wide the price range should be; how price revisions should be determined; whether or not price revisions should follow market trends; and how disposals from stockpiles in consuming nations should be tied in to ICA disposals.

If the consuming and producing countries encounter difficulty in reaching agreement with each other, the same is also true of relations between the producing countries alone. Areas of potential discord are: the sharing of production cutbacks; preferential contracts between importing and exporting countries; market sharing between old and new producers; and pricing differences between low and high cost producers.[79] There are also problems related to the nature of the commodities themselves. It is easier to develop a successful ICA for a commodity whose price instability is primarily related to supply factors. On the other hand, according to the Inter-American Development Bank:

> if stability is due to demand disturbances, price stabilization will decrease the level of earnings below what they would be in an unrestricted market and it will stabilize earnings fluctuations if demand is sufficiently price inelastic.[80]

The dominant source of price instability in the world market for coffee, iron ore, bananas and bauxite[81] is on the supply side. For sugar, cotton, beef and soybeans, it is a mixture of supply and demand distortions. For copper, the primary cause of price fluctuations is demand.[82] We shall discuss the case of copper later.

Consumer countries tend to join ICAs for various reasons. During the Carter administration, the U.S. position was as follows. In general, according to then Assistant Secretary of the Treasury, C.F. Bergsten, an ICA must

provide 'net economic benefits' to the United States, otherwise it will not participate.[83] In addition, ICAs must stabilize prices around market trends and not be designed to raise prices and transfer revenues from consuming to producing countries. There must be a balance of benefits and responsibilities among producers and consumers. Market forces must not be negated. Export and production controls are considered to be less efficient, less manageable, and more disadvantageous to consumers than buffer stocks. Supply management is generally unacceptable to the USA if it is a producer, since such controls would apparently contravene U.S. anti-trust laws. However, as Bergsten points out:

> where an international buffer stock is not feasible or appropriate, [the USA] can accept producer-consumer arrangements which combine export quotas and nationally-held stocks if they include a flexible quota reallocation system and provide for the accumulation of sufficiently large stocks to protect consumers in the event of price surges.[84]

Finally, the United States supports joint financing of buffer stocks by producing and consuming countries. This general policy on international commodity agreements has been adhered to by the Reagan administration, but has been interpreted more rigorously. In particular, the Reagan administration has concentrated on 'economic soundness' in terms of (ICA) compatibility with the allocative role of the market. For this and other related reasons, the USA did not join the Sixth International Tin Agreement in 1982. One other area of emphasis which seems to have been given new attention is the need to promote 'a relationship of cooperation between producers and consumers, reducing the risk of cartel-type activity.'[85] In general, it can be stated that in the United States there has been a long-standing preference for a case-by-case approach to international commodity agreements.[86] It would appear that the dominant factor behind the support of France, the smaller countries of the European Economic Community, and Japan for international commodity agreements is the security of supply. This motivation leads those countries to support commodity agreements 'even when they are of doubtful economic merit...', according to a U.S. study.[87]

International commodity agreements are seen by some countries as international institutions which build bridges of cooperation between producing and consuming nations and which reduce the possibilities of unilateral disruption of markets. It is believed that ICAs have the potential for maintaining a better balance of supply and demand, within a reasonably stable planning environment, so that there is greater efficiency in the process of allocating investment funds. New exploration and production would be encouraged at the right time and excess production would be discouraged, thus generating greater efficiency.

Perhaps the greatest inducement is the prospect of controlling imported inflation. Higher commodity prices lead to higher prices for final products,

followed by demands for increased wages and cost of living allowances, which eventually lead to still higher prices for goods exported to the country which exported the higher priced commodity in the first place. But, when the price of the exported commodity drops, there is not necessarily a corresponding drop in the wages and prices in the importing country or in the price of its exports. This phenomenon is called the 'ratchet effect', and it has a number of adverse consequences. Bergsten *et al.* warn that:

> higher commodity prices result in an income shift from the periphery to the centre, and, within the periphery, from poorer countries to richer countries. Moreover, within all countries, commodity inflation hits the poor, the old, the unskilled, and the unorganized disproportionately, resulting in a distribution of income that favours the haves over the have-nots.[88]

Price stability makes it easier for the governments of exporting countries to plan more effectively for the maintenance and expansion of the economy. It helps to ensure more even employment and labour income levels, perhaps reducing political instability. Further, price stability may aid in ensuring a more stable flow of revenues to the government of the exporting country. As a result of the drop in copper prices after April 1974, Zambia's gross domestic product fell by 15 percent, while its ability to buy imports fell 45 percent between 1974 and 1975. The negative impact of the price decline was six times that of the increased cost of importing oil after the OPEC price hike in the fall of 1973.[89] For producing companies (public or private), price stability generally lessens the risks of doing business and perhaps the cost of risk capital. It helps avert the expense of closing and reopening mines and processing facilities, while promoting a utilization of capacity that is more evenly balanced with demand.

For consuming countries, ICAs offer the prospect of a greater guarantee of equal or nondiscriminatory access to supplies, as well as a promise of greater security of supply. This, in turn, along with price stability, would help to restrain expensive substitution, as well as limit the development of domestic low-grade, high-cost ores and the costly process of high-grading when prices are low. It would also encourage recycling, since 'such industries tend to bear the brunt of depressed conditions' because they are more labour intensive and less capital intensive than their mining company competitors.[90] Price stability should allow most consumers to utilize their capital more efficiently by maintaining smaller inventories.[91] Finally, there may even be a saving in foreign aid disbursements to exporting countries affected by price declines. In 1961 the U.S. Secretary of State noted that:

> it should be remembered that a drop of a few cents in world commodity prices could wipe out any contribution we might make through our (foreign) aid in helping the underdeveloped country concerned.[92]

We have already discussed problems that could arise among producers

and consumers, and that are due to the nature of the commodity. Some of these problems could create weaknesses in ICAs and present disadvantages for producers and/or consumers. But there are other problems as well. ICAs may not be efficient mechanisms for redistributing income from developed countries to the LDCs. As Ritter points out:

> there is no direct correspondence between LDC need or capacity to utilize resource increases effectively, on the one hand, and the patterns of incidence of benefits and costs among LDCs, on the other.[93]

Partly for this reason, most consuming countries tend to stress the virtues of compensatory financing first, and those of ICAs second. Moreover, price stabilization would probably benefit the more advanced developing or developed country exporters and those with larger production, in contrast to the smaller, poorer LDC producers. Since most ICAs are not likely to increase the revenues of the exporters, unless the price is set around a growing trend somewhat above the market trend, the consuming countries would probably benefit.[94] It is for this reason that Behrman makes the following argument:

> the anti-inflationary aspect of a pure price stabilization program implies relatively greater benefits for consumers, but a better balance of the distributions of benefits and costs might be attained by aiming for a slight increase [he suggests 2 percent] in the secular price trends above levels which otherwise would have prevailed.[95]

But, if the long-run price trend set by an ICA is above the market trend, substitution in consuming countries would be encouraged, as has happened in the case of tin.[96] At the same time, efforts to diversify the economies in exporting countries might be curbed and over-production might be induced.[97] There are also other problems. In the event that supply controls (production and/or export restrictions) are used, high and low cost producers would likely be affected equally, resulting in a loss of efficiency. In addition, exporting countries without adequate financial reserves would probably be unable '...to withstand pressure to place their entire production on the market.'[98] This could be done openly, or it could be done surreptitiously with at least part of the production exported by smuggling. In general, the benefits of price stabilization through ICAs appear to have been overestimated, while costs (for buffer stocks in particular) have likely been underestimated.[99]

ICAs have not exhibited a high success rate historically.[100] Those who argue that international mineral agreements are and will be unsuccessful usually point to the failings of the International Tin Agreement (ITA). Those who claim that international mineral agreements can succeed *also* look at the Tin Agreement, but suggest revisions. The International Tin Agreement grew out of the circumstances of over-production following World War II, the shortages during the Korean War, and the 30-percent decline in tin prices following that war. The first agreement began in 1956. The agreements run for 5 years, from 1 July in the year of inauguration to 30 June of the final

year. France, Britain and Canada joined in 1956, Japan at the beginning of the second agreement in 1961, the USSR and West Germany at the beginning of the fourth agreement in 1971, and the United States finally in 1976 for the fifth accord. The Sixth Tin Agreement came into effect on 1 July 1982.

The basic objectives of the ITA are to balance supply and demand, stabilize the price of tin by avoiding excessive fluctuations, and expand production. The mechanisms used in the agreement are a buffer stock (38,500 tonnes) and export quotas which are based on an average of about 4 years' production. Producing and consuming countries have equal voting representation. Producers make mandatory contributions to finance the buffer stock, while those from consumers are voluntary.[101] Only France and the Netherlands made such contributions during the fourth agreement.

There have been many criticisms of the ITA in the past, most of them deserved.[102] The agreement has been only marginally successful in stabilizing prices and revenues to producers (public and private). It has had much better luck in defending the floor price than the ceiling price: for example, the market price has been above the ceiling price (which has been adjusted numerous times) in October and November of 1957; from June to December in 1961; in March of 1962; for two years and nine months from October 1963 to July 1966; from November 1973 to July 1974; and for most of the period of the fifth agreement from July 1976 to June 1980.[103] The disposals and purchases of tin by the U.S. government stockpile authority have been far more important in stabilizing tin prices than the buffer stock operations of the ITA. Had the U.S. government not made such interventions there would likely have been more conflict between producers and consumers. In general, tin prices were not adjusted to market trends; but, if they had been, it is likely that the agreement would have collapsed.

Despite the fact that tin prices, by and large, stayed above market trends, there was insufficient encouragement of new investment, particularly in the 5 years following 1973. This was due largely to the taxes on gross production and tin exports by producing countries, which accounted for a significant portion of the cost of producing tin. Thus, the price range did not generate market efficiency. Export controls have been used improperly, i.e. during market upturns,[104] with the result that prices have risen higher than they otherwise might have.

Perhaps a major factor behind the failure of the tin agreement has been the past refusal of the consuming countries to commit themselves to mandatory financing of a buffer stock. Had such a commitment been forthcoming in the past, the buffer stock would likely have been bigger, and thereby have had a greater measure of impact on price fluctuations: 'in essence, consuming countries failed to protect their own interests by this approach in the past.'[105]

The credibility of the International Tin Agreement has recently been

called into question by the activity of LDC tin-producing countries. In early 1977, when tin prices moved beyond the agreed ceiling, tin producers such as Malaysia and Bolivia held back on production and exports, thus encouraging the price of tin to rise even further. Largely for this reason the Fifth Tin Agreement was a chimera. Then, when there was a failure to reach a Sixth Agreement in 1981, the Fifth Agreement was extended for another year. Late in 1981 Malaysia quietly began to buy 60,000 tons of tin on the London market.[106] As a result, the price of tin rose sharply. Finally, in the course of negotiations for the Sixth Agreement, Malaysia threatened to pull out of the agreement unless Indonesia and Thailand agreed to participate in a tin producers cartel (which is supposed to work in lock-step with the agreement). Though reluctant, both Indonesia and Thailand joined. It is expected that the cartel will have only a moderate effect on prices, which have dropped considerably since 1982.

The Degree of Dependence of Major Mineral Importing Countries

From the beginning of the industrial revolution up to the present, the more developed countries have been the predominant consumers of mineral resources. As we noted earlier, in the last century Japan and Europe became net importers of minerals, while the USA became a net importer in the 1930s. Despite the fast growth rates of developing countries, particularly in Latin America and the Pacific Rim in the 1960s and 1970s, the developed countries remain the predominant importers of nonfuel mineral resources. As we note in table 5, developing countries (LDCs) account for usually less than 12 percent of total market economy imports for tin, copper, iron ore, aluminum, manganese and phosphate. In all of these cases there are three contributing factors:

i high self-sufficiency for one or more of the minerals;
ii lower levels of economic development than the developed countries;
iii lack of foreign exchange (e.g. in the case of phosphate rock which is used for fertilizer).

Just how dependent are the major industrial importing countries for their mineral supplies? Table 6 surveys the U.K., the EEC, Japan and the USA in regard to their use of imported minerals as a percentage of apparent domestic consumption. In many instances, these countries rely on imports for 100 percent of apparent domestic consumption. For the U.K. this is true of 22 of 27 minerals; 13 of 27 for the EEC, 14 of 26 for Japan and 2 of 27 for the USA. Taking all of these minerals into consideration, the U.K. is 96.4 percent dependent on imports for total apparent domestic consumption, the EEC 88.3 percent, the USA 59.6 percent, and Japan 91.6 percent.

On which parts of the world are the industrial nations most dependent

TABLE 5

The Developing Market Economy Share of World Imports
(Value as a percent of total Market Economy imports)

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Tin	8.8	8.2	9.4	9.6	10.5	10.9	9.7	11.1	10.1e	6.7e
Copper: excluding cement copper	8.9	9.0	8.1	10.0	12.6	12.1	14.1	14.4	13.5e	11.9e
Copper: refined unwrought	8.9e	9.2e	8.2e	8.5	9.0	9.0	10.4	10.0e	8.6	8.6
Copper: excluding matte	0.7	1.1	0.8	0.8e	1.3e	2.1	3.3	1.9e	3.0	5.4
Iron ore concentrates	1.0	0.8	0.9	1.1	1.5	2.0	3.5	4.0	4.7e	2.9
Aluminum ores, alumina	7.9	8.4	10.8e	9.0	8.4	11.2	10.0	4.8e	5.7e	n.a.
Aluminum ore concentrate	2.0	2.1	2.3	1.7	1.8	1.7	2.1	2.6	3.4e	0.5e
Manganese ore concentrate	1.8	1.5	2.7	3.7	4.0	4.9	7.9	10.1	9.8e	7.8e
Natural calcium phosphates etc.	12.7	11.7	13.8	14.0	15.7	16.5	17.1	17.3	17.5e	9.5
Phosphates unground	n.a.	n.a.	n.a.	n.a.	n.a.	10.5	26.3	n.a.	n.a.	7.3

Source: United Nations, 1980, *Yearbook of International Trade Statistics.*

Notes: e = estimate.
n.a. = not available.

for their mineral supplies? While there are insufficient hard data to answer that question categorically, there are enough to suggest the following pattern:[107]

i the USA, Japan and West Germany are more dependent than other countries on South Africa;
ii Belgium-Luxembourg and France are more dependent than other countries on the rest of Africa;
iii the USA is more dependent than other countries on Latin America and Canada;

TABLE 6

Imports of Minerals by Canada's Major Trading Partners (as percent of total apparent domestic consumption)

Mineral	U.K.[a]	EEC[c]	USA[g]	Japan[j]
Antimony	100	91	51	100
Asbestos	100	82	80	99
Bauxite	100	84[d]	94[d]	100
Cadmium	78.2	53	63	0
Cesium	100	100	100[h]	100
Chromium	100	100	90	99
Cobalt	n.a.	100	91	100
Columbium	100	100[e]	100	100
Copper	87.9	99	55	87
Germanium	100	100	12[h]	100
Iron ore	90.5	79	28	99
Lead	64	70	10	75
Manganese	100	99	98	97
Mercury	100	85	39	n.a.
Molybdenum	100	100	0	99
Nickel	100	100	72	100
Phosphate rock	100	99	0	100
Potash	83.4	1	68	100
Platinum group	100	100	85	98
Selenium	100	100	49	n.a.
Tantalum	100	100[e]	91	100
Tin	100	95	80	96
Titanium	100	100[f]	43[i]	100[i]
Tungsten	100[h]	77	52	75
Uranium	100	n.a.	n.a.	100
Vanadium	100	100[e]	42	100
Zinc	100	71	67	59
Zirconium	100	100	50[e]	100
Average	96.4	88.3	59.6	91.6
Number of minerals	27	27	27	26

Sources: Bureau of Mines, U.S. Department of the Interior, *Minerals Yearbook Volume* III, *Area Reports: International, Centennial Edition, 1981* (Washington D.C.: Government Printing Office, 1983); Jean-Paul Drolet, *Canadian Minerals in a Changing Environment: Elements of Mineral Economics with a Particular Reference to the Canadian Mineral Industry*, Energy, Mines and Resources, 1983; Institute of Geological Sciences, Natural Environment Research Council, *World Mineral Statistics 1976-80: Production, Exports, Imports* (London: Her Majesty's Stationery Office, 1982).

[a] Figures are for 1980.
[b] Estimate.
[c] Figures are for 1980. The EEC in 1980 included Belgium, Denmark France, Fed. Rep. of Germany, Ireland, Italy, Luxembourg, Netherlands, and United Kingdom.
[d] Includes alumina.
[e] Trade of columbium, tantalum and vanadium reported together.
[f] Ilmenite and rutile.
[g] Figures for USA are 1981 estimates as of 20 January 1982.
[h] Figures are for 1977.
[i] Ilmenite.
[j] Figures are for 1980.

iv Japan and West Germany are more dependent than other countries on the United States;
v Japan is more dependent than other countries on Oceania, Asia and China;
vi West Germany, Japan and Italy are more dependent than other countries on the Soviet bloc.

In general, the United States and Japan have the most diversified mineral supply lines of the major industrial countries. Holland and Belgium-Luxembourg have the most concentrated supply lines. The country which appears to have the greatest degree of diversification combined with the least amount of dependence is the United Kingdom. The three nations most reliant on Canada for mineral supplies are the United States, Japan and the United Kingdom.

It is often said that in the future Canada is going to face increasing competition from the mineral exports of the less developed countries. Since increased competition from LDCs would affect Canada's bargaining strength with its trading partners, this is a matter that needs some clarification.

World Mineral Exploration and Development Trends

Throughout the 1960s more than 80 percent of total noncommunist world exploration expenditures went to the developed countries, with over 70 percent of the same total going to Canada, the United States, South Africa and Australia.[108] Later we shall discuss the reasons for Canadian attractiveness to foreign and domestic mineral investors. Similar reasons hold for the other developed country producers, with a possible question mark in the case of South Africa's ability to offer political stability. There were numerous reasons why investors tended to steer clear of LDCs: political instability; violence; broken contracts; increased taxes; threats of nationalization; special export taxes; foreign exchange controls; increase in the size of projects; price controls to combat inflation; increased construction costs; higher energy prices resulting in increased extraction costs; the concern by MNCs that the LDCs will keep producing rather than cut back production or terminate it in the event of low mineral prices; and the instability of mineral markets, which increases the risk for investors who worry about having the right price for their product to pay for the investment.[109]

Table 7 clearly demonstrates that mining was not the primary target sector for nationalization policies of LDCs in the period 1960-76. Nationalizations in the mining sector accounted for only about 6 percent of reported cases in that period. The primary target sectors were banking and insurance, agriculture, manufacturing and petroleum. Nonetheless, since mineral development in the LDCs is more geographically concentrated than any other sectoral investment (with the probable exception of petroleum), when

TABLE 7

The Number of Private Enterprises Taken Over by Developing Countries, 1960-69 and 1970-76[a]

Industry	1960-69	1970-76	Total
Mining	32	48	80
Petroleum	40	180	220
Agriculture	98	174	272
Manufacturing	76	145	221
Trade	28	20	48
Public utilities	31	27	58
Banking and insurance	133	216	349
Other	17	104	121
Total	455	914	1369

Source: UN Commission on Transnational Corporations, in J.R. Basche, *Nationalization: The Experience of U.S. Companies in the 1970s*, New York, Conference Board, 1978.

[a] Private enterprises include companies from the USA and from many other countries

nationalization does occur in the mineral-rich LDCs, investor confidence can be seriously shaken. Thus it is important to note that LDC nationalizations in the mining sector increased by 50 percent over the period 1970-76 as compared to the previous decade. The trend to increased nationalization in the 1970s is reflected in table 8.

This increase in nationalization explains in part why over 80 percent of total funds for new exploration and development in the noncommunist world during the 1970s went to the United States, South Africa, Australia and Canada.[110] According to Mikesell, high taxation and the possibility that the government could break a contract long before the agreed-upon termination were the two major factors which tended to deter direct foreign investment or project financing in LDCs.[111] However, Tilton maintains that the real reason is cyclical volatility for mineral prices:

> if investment is inadequate, the culprit is likely to be the cyclical volatility that plagues the mineral sector. Investment difficulties would likely diminish if cyclical volatility could be reduced.

The resolution of cyclical volatility could undoubtedly help improve investment, but it seems somewhat naive to conclude that this is the main factor which deterred investment in the LDCs in the 1970s, when it did not deter investment in developed countries.

European companies have been the most hesitant to invest in LDC mineral projects. In 1979, it was reported that:

> since 1974, Europe has made almost no mining investment in Africa, except for

uranium exploration. Since 1970, its mining investment in developing countries has been about half that of the U.S.[113]

Investments by European mining companies in the LDCs declined steadily in the period 1961-77. An analysis of the exploration expenditures of 14 European mining companies reveals that, while 57 percent of their exploration funds went to the LDCs in 1969, this figure dropped to 11 percent in 1976. There was a slight increase in 1977, to 19 percent, due to greater European interest in funding worldwide exploration for uranium and to reliance on Brazil as an anticipated future stable supplier of minerals.[114] According to

TABLE 8

Nationalization of Foreign Mineral Investments in LDCs, 1960-75

LDC	Year	Minerals Involved[a]
Bolivia	1971	tin tailings, lead, zinc
Chile	1967	copper
	1969	copper
	1971	copper, nitrates, iron ore
Gabon	1974	iron ore
Ghana	1972	diamonds, gold, manganese, bauxite
Guinea	1961	bauxite
	1972	bauxite
Guyana	1970	bauxite
	1974	bauxite
Jamaica	1974	bauxite
Mauritania	1974	iron ore
Mexico	1967	sulphur
Morocco	1967	iron ore
Peru	1970	copper
	1975	iron ore
Sierra Leone	1970	diamonds
Surinam	1974	bauxite
Uganda	1975	copper
Venezuela	1974	iron ore
Zaire	1966	copper, cobalt
Zambia	1969-70	copper, cobalt

Sources: Bureau of Research and Intelligence, *Nationalization, Expropriations and Other Takings of United States and Certain Foreign Property Since 1960, 1971;* Bureau of Research and Intelligence, *Disputes involving U.S. Foreign Direct Investment, July 1, 1971, Through July 31, 1973, 1974;* OPEC, *Annual Report, 1975;* *New York Times,* 24 September 1976; United Nations Centre on Transnational Corporations, *Transnational Corporations and the Processing of Raw Materials: Impact on Developing Countries,* (Vienna: UNIDO, February 1978).

Note: The investing companies were based in the United States, United Kingdom, Canada, Switzerland, West Germany, France, Belgium, South Africa, Italy, and Spain.

[a] This column does not represent the number of nationalizations; it only indicates the mineral sector affected. Thus, when a mineral is listed it could represent one or more cases of nationalization.

a study by the Anglo-American Corporation, in the 1960s and 1970s European mining companies spent $400 million per annum in all countries to secure supplies of nonferrous minerals for the European market. In the 1980s they will need to spend $2.4 billion annually for the same purpose.[115] The necessity of making this great leap in annual expenditures should provide the exporting countries with considerable leverage *vis-à-vis* the European companies.

A study of worldwide investment in exploration activity by 18 North American mining companies reveals that more than 80 percent of their funds were spent in the developed mineral-producing countries in the first half of the 1970s.[116] In 1966, 58.4 percent of total U.S. direct foreign investment in mining and smelting was in developed countries, and 41.6 percent in LDCs. By 1976 the proportion spent in the developed countries had grown to 67.2 percent, with 32.8 percent in LDCs.[117] Mikesell found that:

> over the period 1973-1976 net U.S. direct investment capital flows to the mining and smelting industries in the developing countries averaged less than $200 million per year.[118]

Meanwhile, about half of Japan's total foreign investment expenditure goes to mining and smelting in LDCs, and its annual investments are now higher than those of the EEC mining companies. This pattern is likely to continue.[119]

Other sources of financing for exploration and/or development in the LDCs have not been adequate to replace the withdrawal of foreign private sources and the failure of government-run enterprises in countries such as Chile, Peru, Zaire and Zambia (which are capital-poor) to generate sufficient funds for successful exploration programs.[120] For example, the United Nations Development Programme's Mineral Survey Programme spent only $102.7 million ($168 million if training and other expenditures are included) between mid-1959 and mid-1976 to explore for minerals in LDCs. This UNDP effort has been primarily concentrated in Africa and Latin America, in both politically stable and politically unstable countries. Furthermore, in some cases (e.g. in Somalia, Sudan, Chile, Guinea and Burundi), discoveries made in the mid-1960s to early 1970s have not been developed, for political and/or economic reasons.[121] The U.N. Revolving Fund for Natural Resources exploration had only $22 million in subscriptions by the end of 1977 and has proceeded with only a few projects.[122] In the first half of the 1970s the World Bank and the International Development Agency were providing only about $50 million per annum to finance mineral projects in the Third World.[123] However, it is believed that, on average, from 1977 through to the end of 1981 the World Bank increased its annual lending to between $550-$575 million for LDC mining ventures (not including the financing of infrastructure through other programs).[124]

Mikesell[125] estimated roughly that, for the period 1974-78, about $1 billion per year was spent on nonfuel mineral exploration and development

in the LDCs, and that $5.5 billion per annum is needed in the LDCs for the period 1977-2000. The United Nations Centre for Natural Resources, Energy and Transport concluded that about $350-650 million in 1977 dollars will be needed annually for nonenergy mineral exploration in the LDCs for the period 1978-90.[126] Of the $5.5 billion required annually by the LDCs, Mikesell predicted that only about $1 billion will be forthcoming from LDC sources.[127] For example, countries with 'growing economies and good export earning prospects' such as Brazil, Venezuela and some of the Middle East oil producers may be able to provide a large part or all of their financial requirements for mineral exploration and development. In Mexico and the Philippines, the majority of funds will likely come from the government and domestic firms. Under current circumstances, some of these countries, such as Brazil and Mexico, will be hard pressed to meet these expectations. For most other countries, mineral exploration and development will depend on foreign financing, although not necessarily foreign direct investment. This is especially true for recent copper mining developments. As Mikesell reports:

> in recent years, most of the external capital for the mining industries has taken the form of intermediate commercial bank loans, credits from mining equipment companies supplied or guaranteed in part by government credit institutions, and loans from consumers. Many of these credits have been associated with equity investment by international mining companies.[128]

For the medium term there is no concern about shortages from LDC sources due to lack of investment, although there is occasional criticism of tin-producing countries which restrain investment because this leads to higher tin prices.[129] However, there is concern for the inadequate levels of exploration funding in LDCs, which could lead to shortages by the end of the 1980s and the beginning of the 1990s.[130]

What are the spending intentions of governments and private mining companies for mineral development in the 1980s? An excellent preliminary estimate comes from an *Engineering and Mining Journal* study in 1981.[131] The study reviewed the following:

i projects now under construction;
ii projects with development programs but for which further financing may be required and for which construction has not yet begun;
iii projects in the initial proposal stage;
iv projects in the USA which have been suspended or deferred.

In table 9 we discover that as of 1981 approximately 63 percent of total known, planned, or ongoing expenditures were going to the less developed countries. The LDCs were to receive about 60 percent of the investment in aluminum, 88 percent for copper; 24 percent for gold; 57 percent for industrial minerals; 83 percent for iron ore; 28 percent for lead-zinc; and 60 percent for nickel. If we exclude aluminum and copper, the amount of money

TABLE 9

Capital Investment Plans of the Mining Industry by Major Commodities, 1981 (U.S. $ billion)[a]

	Developed Countries[d]	Less Developed Countries
Aluminum	10.7	16.1
Copper	2.2	16.9
Gold	3.4	1.1
Industrial minerals[b]	4.9	6.4
Iron ore	1.3	6.6
Lead-zinc	1.5	0.6
Molybdenum	1.3	—
Nickel	1.1	1.7
Uranium	2.9	—
Other precious metals	0.5	0.5
Other minerals[c]	0.2	0.2
Total	30.0	50.1

Source: Engineering and Mining Journal, *E&MJ International Directory of Mining*, (New York: McGraw-Hill, 1981), pp. 599-609.

[a] includes domestic and foreign investment figures where available; all figures are approximate.
[b] asbestos, phosphate rock, potash, soda ash, others.
[c] chromium, cobalt, columbium, manganese, tungsten, and light metals such as titanium.
[d] includes Turkey and the Soviet Bloc.

projected to be spent in the developed and developing countries is about the same.

While the *E&MJ* study has already been outdated because of the changes brought by the 1982-83 recession, it does provide a strong indication that some less developed countries are considered good mineral investment bets at present and for the future. In table 10 we can see that, in descending order, Brazil, Canada, Australia, Chile, the USA, South Africa, Indonesia, the Peoples' Republic of China, India, Peru and the Philippines were expected to receive the most domestic and foreign investment in the mineral sector in the 1980s. As of 1981, these eleven countries were to receive approximately 70 percent of total investment in mining (excluding the USSR) until approximately the mid-1980s. In broader regional terms, the major recipients are South America, North America, the western Pacific rim, Asia and South Africa. The minerals receiving the most investment attention are aluminum/bauxite, copper, iron ore, lead-zinc, nickel, and phosphate rock.

If we compare table 8 with table 11 we observe that a number of the countries in the Third World which nationalized mining property in the 1960s and 1970s have again become favoured by foreign investors. Table 11 also reveals other trends:

i MNCs and importing countries are continuing efforts to diversify sources of supply;
ii MNCs have had success in finding financial backers for projects in the LDCs;
iii Brazil, Indonesia, Peru, and the Philippines will become major mineral exporting countries;
iv investors are tending to give less preference to Africa (with the exception of South Africa) for mineral investment in comparison to Latin America and the western Pacific rim.

TABLE 10

Capital Investment Plans of the Mining Industry by Country of Investment, 1981[a]

Rank	Country	Investment Plans (U.S. $ Billions)	Number of Projects
1	Brazil[b]	9.6	19
2	Canada[c]	9.4	41
3	Australia[d]	7.9	24
4	Chile[e]	7.3	14
5	USA[f]	4.4	66
6	South Africa[g]	3.8	16
7	Indonesia[h]	3.4	4
8	China[i]	3.0	5
9	India[j]	2.5	5
10	Peru[k]	2.2	9
11	Philippines[l]	1.6	14
Total		55.1	217

Source: Engineering and Mining Journal, *E&MJ International Directory of Mining* (New York: McGraw-Hill, 1981), pp. 599-600.

a includes domestic and foreign investment figures where available, all figures are approximate.
b aluminum/bauxite, copper, iron ore, nickel, columbium, gold, niobium, phosphate rock, potash, soda ash.
c aluminum, copper, zinc, gold, silver, molybdenum, lead, cobalt, tungsten, uranium, asbestos, potash, soda ash.
d aluminum/bauxite, copper, uranium, silver, lead, zinc, iron ore, nickel, columbium, tungsten, molybdenum, gold, rutile, zirconium, ilmenite.
e copper, molybdenum, silver, gold, cobalt.
f aluminum, copper, molybdenum, lead, zinc, cobalt, nickel, silver, tungsten, gold, titanium, uranium, phosphate rock, soda ash.
g copper, manganese, gold, diamonds, platinum, chromium, uranium, asbestos, phosphate rock.
h aluminum, copper, nickel, phosphate rock.
i People's Republic of China; includes aluminum, copper, iron ore.
j aluminum, iron ore.
k copper.
l aluminum, copper, gold, silver, molybdenum, nickel, iron ore, chromium.

TABLE 11

LDC Mineral Development in the 1980s
(1981 status)

Mineral	Country	Production Initiation	Class[a]	Location
Alumina	Brazil	1983	AB	Alunorte
Alumina	Guinea	1980s	AB	Ayerkoe, Boke
Alumina	India	—	B	Andhra Pradesh
Alumina	Jamaica	—	A	Elizabeth Valley
Alumina	Jamaica	—	A	Halse Hall
Alumina	Jamaica	—	A	Manchester
Alumina	Venezuela	1982	A	Ciudad Guyana
Aluminum	Algeria	1982	A	M'sila
Aluminum	Argentina	1980s	A	Puerto Madryon
Aluminum	Bahrain	1981	A	Bahrain
Aluminum	Brazil	1981	A	Aratu, Bahia
Aluminum	Brazil	1984	AB	Maranhoe
Aluminum	Brazil	1982	A	Santa Cruz
Aluminum	Brazil	1984	A	Villa Do Conde
Aluminum	China	1985	C	Guangxi Zhuang
Aluminum	China	1981	B	Kueiyang, Kueichou
Aluminum	Dubai	1981	B	Dubai
Aluminum	India	1985	C	Orissa
Aluminum	India	—	B	Renuket
Aluminum	Malaysia	1982	A	Sabah
Aluminum	Mexico	1983	C	Tampico
Aluminum	Philippines	1985	B	Leyte
Aluminum	Saudi Arabia	1982	C	Jubail
Aluminum	Trinidad	1985	B	Point Lisas
Aluminum	Zaire	1985/86	C	Banana, Cabinda
Bauxite	Sierra Leone	—	BC	Port Loko
Bauxite	Venezuela	1985	AB	Bolivar
Asbestos (fiber)	Mexico	—	B	Pegaso
Copper:				
Cu	Argentina	1986	BC	El Pachon
Cu	Brazil	1982	A	Camacari, Bahia
Cu	Brazil	—	A	Carajas, Para.
ore	Brazil	—	AB	Chapada
ore	Burma	1981/82	AB	Monywa
Cu	Burma	1981/82	AB	Saliugyi
Cu	Cameroon	1981	A	Edea
ore	Chile	—	C	Andina
ore	Chile	1983	C	Andacollo
ore	Chile	1986	BC	Los Bronces
Cu	Chile	1983	A	Charanal
ore	Chile	1982	A	Chuquicamata
ore	Chile	—	A	Iquiqui
ore	Chile	1986	C	Los Pelambres
Cu	Chile	1985	B	Quebrada Blanca
ore	Chile	1982	A	El Salvador
Cu	Chile	1985-90	B	El Teniente
Cu	China	—	B	Kinagi Province
Cu	China	—	B	—
—	Colombia	—	C	Antioquia

TABLE 11 (continued)

LDC Mineral Development in the 1980s

Mineral	Country	Production Initiation	Class[a]	Location
ore	Indonesia	1982/82	A	Irian Jaya
Cu	Jordan	—	BC	Wadi Aruba
ore	Mexico	1986	A	Cananea, Sonorra
Cu	Mexico	—	A	Empalme, Sonorra
concentrate	Mexico	—	BC	Los Verdes
concentrate	Morocco	1981	AB	Bleida
ore	Oman	1982	A	Sohar
ore	Panama	1980s	C	Cerro Colorado
ore	Pakistan	1984	B	Saindak
Cu	Peru	1984	BC	Cerro Verde
ore	Peru	1983	BC	Cerro Verde
ore	Peru	1982	B	Cobriza
Cu	Peru	—	AB	Ilo
Cu	Peru	1982	A	La Oroya
concentrate	Peru	—	BC	Quellaveco
ore	Peru	—	B	San Vincente
ore	Peru	—	BC	Tintaya
Cu	Peru	—	C	Toromocho
ore	Philippines	1983	AB	—
ore	Philippines	1982	AB	Baguio
ore	Philippines	1981	A	Pavado de Norte
ore	Philippines	1983	B	Hinoboan
ore	Philippines	1981	A	Ilocos Norte
ore	Philippines	1982	A	Sipalay
Cu	Philippines	1983	A	Leyte
—	Papua New Guinea	—	C	Treida River
ore	Saudi Arabia	—	C	Al Masane
concentrate	Turkey	1983	B	Kure
Cu	Uganda	—	B	Kilembe
ore	Zambia	1981-85	A	—
Chromium:				
FeCr	Philippines	—	B	Tagaloan
concentrate	Philippines	1983	AB	Lorente
FeCr	Turkey	1985	B	Elazig
Cobalt	Zambia	1982	A	Chingola
Columbium	Brazil	1981	B	Araxa
Gold:				
Au	Brazil	1985	A	six mines
ore	China	—	C	Wei Fang, Shandang

The trend toward diversification of mineral supplies by the MNCs and the major consuming countries is quite obviously one of the significant mineral-related trends in this century. Diversification of supplies can have a major impact on regional growth and development in various parts of the

TABLE 11 (continued)

LDC Mineral Development in the 1980s

Mineral	Country	Production Initiation	Class[a]	Location
Iron:				
pellets	Bahrain	1983	AB	—
ore	Brazil	1980s	BC	Aguas Claros
ore	Brazil	1984	A	Algeria, SP
ore	Brazil	1985	A	Carajas, Para
pellets	China	1983	B	Chi-Ta-Shau Liaoning
sponge	Columbia	1980s	BC	—
ore	India	1982	A	Kudremukh
pellets	India	—	B	Mangalore
ore	Liberia	1983	AB	—
ore	Mauritania	1980	AB	Gelbs
pellets	Mauritania	1982/83	A	Mouadhibou
ore	Mexico	—	AB	La Perla, Chi
ore	Mexico	1984	AB	Aguila, Mich
ore	Mexico	1984	A	Las Truchas
concentrate	Philippines	—	AB	Rizal
pellets	Senegal	1987	B	—
Lead and Zinc:				
Pb	Bolivia	1982	AB	Karchi Pampa
Pb concentrate	Chile	1981	B	Aysen
Zn concentrate	Mexico	1981	A	La Minita
ore	Mexico	1983	A	Naica, Chi
Zn	Mexico	1982	A	San Luis Potosi
ore	Mexico	1982	A	San Martin, Zac
ore	Mexico	1981	A	Santa Barbara, Chi
ore	Mexico	1981	A	Taxco Guerreno
Pb	South Korea	1981	A	Onsan
Zn	Thailand	1983	AB	—
concentrate	Tunisia	1985	AB	three mines
Manganese (ore)	Gabon	1981	A	Moavda
Molybdenum:				
Mo	Chile	—	A	Chuquicamata
ore	Mexico	—	B	Cumobabi, Son.
Nickel:				
FeNi	Brazil	—	B	Bario Alto, Goias
Ni	Brazil	—	B	Sao Joao do Piani
FeNi	Colombia	1982	AB	Cordoba
Ni	Indonesia	1983/84	A	Gag Island
Ni	New Caledonia	1981	A	Doniambo
Ni	New Caledonia	—	A	Koumac
ore	Philippines	1982	AB	Sipalay, Negros

globe. It also has price implications for both suppliers and consumers. In order to improve our understanding of the phenomenon of diversification, we are obliged to review the initiatives undertaken by the industrial nations.

TABLE 11 (continued)

LDC Mineral Development in the 1980s

Mineral	Country	Production Initiation	Class[a]	Location
Phosphate:				
fertilizer	Brazil	1981	A	Patos de Minos
rock	Colombia	—	—	Pesca and Sardinata
concentrate	Egypt	1985	BC	Abu Tartur
concentrate	Egypt	—	A	Al-Hamrawan
fertilizer	Indonesia	1982	A	E. Kalimantan
concentrate	Mexico	1982	A	Santo Dom. Baja Cal.S
prod.	Morocco	1980s	B	Meskala
ammonium	Pakistan	1981	A	Haripur
rock	Tunisia	1987-90	AB	Gofsa
prod.	Turkey	—	A	Mesin
Potash:				
KCl	Brazil	1983	B	Sergipe
potash	Jordan	1982	A	Dead Sea

Source: Engineering and Mining Journal, *E & MJ International Directory of Mining* (New York: McGraw-Hill, 1981) pp. 599-609.

[a] A: projects under construction; B: projects with development program but for which further financing may be required and for which construction has not begun; C: projects in the initial proposal stage.

Diversification and Procurement: France, the United Kingdom, West Germany, Japan and United States

France did not begin to reorient its approach to the diversification of foreign mineral supplies until the dissolution of its colonial empire was under way in the mid-1950s. Previously, France had relied heavily on its colonies for mineral imports. While France's needs are still partly met by its former colonies, its sources of supply are presently more diversified.

The chief vehicle for the French approach is a government corporation, Bureau de Recherches Géologiques et Minières (BRGM). It is a centralized organization that controls a diverse array of specialized companies (sometimes through majority, but more often minority, ownership) in order to guarantee France access to overseas nonfuel mineral supplies, and to promote domestic mining. BRGM itself engages in scientific and technical research as well as geological surveys within France. Overseas, through its subsidiary holding

companies, Société d'Études de Recherches d'Exploration Minière (SEREM) and Société de Cooperation Minière et Industrielle (SOCOMINE), BRGM is involved in worldwide direct mineral investment. Through Société Française d'Études Minières, BRGM undertakes worldwide mine project engineering, project management, technical training and townsite construction.[132] In addition, BRGM offers financial assistance to prospective private mining companies of foreign countries, while at the same time the French government also

> provides its mineral industry with special tax concessions, and an overseas investment insurance scheme. In short, the French government has taken an integrated set of pragmatic actions to meet the country's needs.[133]

Complementing this government action, there are a few privately-run French companies involved in overseas exploration and development: for example, Le Nickel (nickel, uranium); and Pechiney Ugine Kuhlmann (copper, bauxite, alumina, aluminum, steel, chromium). Many of the French government initiatives are recent. Before 1972, government assistance for exploration and development by French corporations was mainly confined to petroleum ventures. In 1972 the government committed about $75 million for overseas mineral exploration and development.[134] Primarily because of the need to finance postwar reconstruction, the U.K., France, Italy, Japan and West Germany placed restrictions on the outflow of capital until the mid-1960s. This meant that the ownership of foreign mineral resources could not be treated as a priority item by these countries until the mid-1960s. In the interim, they had become heavily reliant on existing British and American and, to some extent, Canadian, South African and Australian mining companies to guarantee access to mineral supplies across the globe.[135]

For decades the U.K. has had a strong overseas presence in mining ventures through such companies as Lonrho Ltd. (Africa), Rio Tinto Zinc Corporation (Australia, Canada, South Africa), Selection Trust (worldwide), Consolidated Gold Fields (worldwide), and Charter Consolidated Ltd. The latter is the most powerful of the British mineral investment houses (with financial interests in Rio Tinto Zinc, the Anglo-American group of companies, Selection Trust, and Le Nickel), and one of the most powerful corporations in the world.[136]

The British government provides no incentives for its corporations to develop foreign land-based minerals. It does, however, give financial assistance for domestic mineral development and for ocean mining. Of course there are also the nationalized industries (iron, steel and coal) which receive subsidies at home and abroad. The government has not developed any insurance scheme to compensate the country's mining companies in the event of expropriation of any overseas mining venture. Part of the reason for this lack of government intervention is that much of the foreign investment is in Australia, South Africa, Canada and the United States where, compara-

tively speaking, there is little threat of expropriation. Finally, for the last two decades British consumption of mineral resources, as compared to that of other developed countries, has fallen due to the use of substitutes and a highly efficient system of scrap collection and recycling.[137]

Being on the losing side in two world wars had left Germany without the corporate longevity of the Americans and British, and without the colonial ties of the other European powers. For example, Amax (now controlled by Standard Oil of California and Selection Trust of Britain), a successful world-wide mining concern, was taken away from Metallgesellschaft A.G. Frankfurt for war reparations after World War I. It was at the time, however, a much smaller company.

At present, West German mineral supply diversification and procurement are provided by domestic and foreign sources. The domestic companies involved are Metallgesellschaft (zinc, lead, copper, tin, chrome, aluminum and tungsten), Preussag (nonferrous metals), Degussa (precious metals), and Thyssen (iron ore). With the exception of some government equity in Preussag, these corporations are privately-owned conglomerates. Prior to 1970, West Germany relied almost exclusively on long-term contracts and the good will of producers to guarantee access to foreign minerals. This tactical orientation began to change in 1970 when the Bonn government introduced an incentive program consisting of loans for up to 50 percent of the cost of foreign exploration and the development of new mines. These loans were to be forgivable if no mines were developed as a result of the investment. In addition, the government provided an investment insurance program as a guarantee against expropriation.[138] Financing is available through two government agencies: Deutsche Gesellschaft für Wirtschaftliche Zusammenarbeit (for activity in less developed countries only) and Kreditanstalt für Wiederaufbau. Further incentives were made available in 1975.[139]

The emphasis of the new incentives was on development of new foreign mineral deposits that might be too risky for private companies alone to undertake. Subsidies of up to 66.6 percent were made available for exploration expenses, 75 percent for new technology for mineral development, and 50 percent or more for new mine development. Repayment is required if the project is successful, beginning 2 years after project completion.

As a result of these government programs, $238 million was spent on exploration by West German companies overseas between 1974 and 1979. At present the country is engaged in many foreign exploration ventures. German interests are worldwide and much investment has occurred in the LDCs (Brazil, Guinea, Indonesia, Mauritania), but the countries in which West Germany is placing most of its mineral investment are Canada, the United States and Australia.[140] This new West German foreign investment has consistently taken the form of minority ownership in joint ventures with the

host government or foreign mining companies.

Japan became embroiled in World War II partly as a result of its desire to secure access to resources through colonization. After the war Japan was forced to reorient and restructure its mineral supply lines; however, the corporate dimensions of its overseas mineral procurement and diversification have remained quite similar. Thus, the basis of this system is still its large trading corporations and their affiliated mining companies: Mitsubishi, Mitsui, Nippon and Sumitomo.

These corporations have been described as 'larger and more diversified than the metal trading companies of the Socialist world.'[141] Their roles are varied. They contract with foreign producers for ores and concentrates, arrange for the transportation of minerals to Japan, provide outlets for the sale of Japanese mining equipment, negotiate loans, and arrange for mine financing. Together with the government, these companies participate in the Metallic Minerals Exploration Agency and the Japan Mining Corporation (formerly the Overseas Mineral Development Corporation) to locate and develop foreign minerals.

The financing of Japanese mineral exploration overseas is undertaken by two agencies: the Overseas Economic Cooperation Fund finances exploration in less developed countries, while the Metal Mining Agency (MMA) of Japan finances exploration in developed countries. Of the latter, the Japanese government reports that

> 50-70 percent of necessary funds are [government loans]; the original fund consists of [the] government's capital and MMA's capital. Y 1,000 million [was] newly invested by the government in 1976.[142]

Development of new mines is financed by the Export-Import Bank of Japan and the Overseas Economic Cooperation Fund, and the liabilities are guaranteed by the Metal Mining Agency. As of 1976 this guarantee was in the order of Y 52.5 billion. Between 1965 and 1974 a depletion allowance system was in effect, but it has been discontinued.[143] The Ministry of International Trade Industry, in cooperation with the Export-Import Bank and the MMA, provides investment insurance to cover the risks of expropriation and loss through other causes.[144]

In the 1960s, Japan's tactics included:

> tax benefits, direct government subsidies and preferential access to foreign raw material supplies. Japanese firms sought to conclude long-term purchase contracts, providing loan capital if necessary to develop production capabilities rather than direct investments.[145]

By 1972, however, the Natural Resources Committee of the Prime Minister's Economic Council was suggesting, among other things, the need to emphasize foreign direct investment in the procurement of minerals; the form was to be joint ventures.[146] There were several reasons for this change. First, it was

believed that 'more lucrative profits were obtained at the mining stage'; second, there was concern that too much of the foreign mineral supply was controlled by foreign, particularly American, corporations.[147] Finally, after the OPEC embargo and price hike of 1973, the Japanese government became more conscious of the problem of security of supply.

American corporations have long dominated international trade in mineral resources. The interests of major American mining companies are worldwide; consider, for example: Alcoa, Kennecott, Hanna, Amax, Freeport Minerals, Bethlehem, St. Joe Minerals, Utah Mining, Marcona, Asarco, Phelps Dodge and Newmont Mining. As in the past, the role of the United States government is that of facilitator. It provides all American corporations operating in the Western Hemisphere (outside the USA) with a reduction in U.S. income tax, from 48 percent to 34 percent. It permits deductions from income tax for overseas exploration and development costs. It also allows the deduction of foreign royalties from the U.S. income tax.[148] However, while the USA often has TAX agreements with other countries to avoid double taxation of income (via foreign tax credits and deferral schemes), it does not provide tax credits for provincial royalties or mining taxes on repatriated profits.[149] Thus, problems arise for U.S. corporations in Canada when the provinces raise their mining taxes or royalties and the corporations want to repatriate their money.

TABLE 12

U.S. Depletion Allowance Incentives, Domestic and Foreign, 1981 (Selected Minerals)

Mineral	Percentage		Mineral	Percentage	
	Domestic	Foreign		Domestic	Foreign
Asbestos	22	10	Lead	22	14
Cadmium	22	14	Molybdenum	22	14
Caesium	14	14	Nickel	22	14
Cobalt	22	14	Platinum group	22	14
Columbium	22	14	Potash	14	14
Copper	15	14	Silver	15	14
Gypsum	14	14	Tantalum	22	14
Bauxite	22	14	Tellurium	14	14
Indium	14	14	Tungsten	22	14
Iron ore	15	14	Zinc	22	14

Source: adapted from Bureau of Mines, 1982.

The U.S. government offers, as well, a comprehensive depletion allowance system for its mining companies at home and abroad, as table 12 indicates. This system generally favours domestic mining operations, although sometimes foreign operations are treated equally, as is the case for caesium,

gypsum, indium and tellurium.

Through various agencies, the U.S. government has provided its mining companies with risk insurance overseas. Under the auspices of the Marshall Plan, insurance against currency inconvertibility due to exchange restrictions began in 1948. Insurance against the risk of war was added in 1956, while insurance against expropriation and politically motivated defaults started in the early 1950s. Insurance against revolution and insurrection commenced in 1961. The insurance program was continued by the Agency for International Development until 1971 when the Overseas Private Investment Corporation (OPIC) took charge. OPIC charges a premium for its insurance: 1.8 percent of the insured value. This represents a significant cost of production for any investor.[150]

Of all the types of insurance coverage, the overseas mining and smelting industry is the most heavily insured (followed by the chemical manufacturing industry). As of 1974, the total risk coverage for the overseas mining and smelting investments of U.S. companies was $2.2 billion. Surprisingly, OPIC does not keep these figures up to date nor does it have figures showing the proportion of total insurance accounted for by each sector. In 1978, 91.0 percent of all types of insurance was for the LDC, with Jamaica, Brazil, the Dominican Republic, the Philippines, Indonesia and South Korea receiving the heaviest coverage. About 9 percent of the total outstanding insurance portfolio was for Europe ($8.9 billion). There is no evidence that any of the insurance covered is for Canada.

In 1977 OPIC extended insurance coverage to the 'exploration, production and processing phases' of minerals and energy projects. Later it added insurance against arbitrary contract changes by the host government and better war risk coverage.[151] OPIC also offers loans for project financing to small American mining companies that might have difficulty in raising capital from financial institutions or from retained earnings. OPIC's focus on insurance for minerals is primarily for cobalt, tin, platinum, palladium, manganese and nickel. These changes by OPIC are indicative of a response to criticism by U.S. mining companies:

> the OPIC investment insurance program has had only limited success in recent years in stimulating mineral exploration and development projects in developing countries, reflecting in some measure the dissatisfaction of American industry with its terms and conditions.[152]

Ocean Mining and Antarctica

If the major developed nations have their way, the mining of the oceans will become the new frontier for mineral development, a frontier unimpeded by insurrection, revolution, expropriation, and currency inconvertibility. At present there are 46 companies from the USA, Japan, West Germany, Britain,

Holland, Belgium, France and Canada operating 7 joint-venture companies attempting to find economical ways of recovering ferromanganese nodules in the oceans (see appendix VI). Total investment at the end of the 1970s was about $200 million, only a small portion of the expected future investment of billions of dollars.[153]

There are no accurate estimates of the total tonnage of ferromanganese nodules, which are spongy, potato-sized objects lying in deposits that cover parts of the ocean floor. Past predictions of a total of 1.5 trillion tons are now considered much too high. More recently, it has been suggested that there are about 500 billion tons of nodules from which the following are recoverable: 2.4 billion tons of copper, 2.4 billion tons of cobalt, 3.6 billion tons of nickel, and 96 billion tons of manganese.[154] These estimates should be viewed with caution. It should also be kept in mind that, though the process is slow, the nodules are continually being formed. So, in a sense, these are renewable resources.[155]

The nodules contain about 30-35 percent metals. The rest is water and waste. The proportion of individual minerals in the nodules varies from region to region in the oceans. The richest known deposits lie in the Clarion Clipperton fracture zone province between Baja California and Hawaii. In this area 28-35 percent of the metal by weight in the nodules is manganese, with 1.2-1.6 percent nickel, 1.1-1.5 percent copper, .05-.07 percent molybdenum, and .01-.25 percent cobalt.[156]

At the moment, some of the technical obstacles involved in retrieving the nodules have not been overcome, although many of the problems involved in processing them have been resolved.[157] Only one corporate group, Ocean Mining Associates, has reasonably firm plans to develop a mine site (1.8 million tonnes per annum) in the Pacific Ocean by 1989. In the recent past it was expected that 'the first sustained commercial production' would begin between 1985 and 1990, and by the year 2000 about 15 or 130 mines would be in production.[158]

A U.S. Department of the Interior study concluded that the possible rate or return on an ocean mining venture would be 8 percent; mining company executives, however, point out that they need at least 30 percent in order to compensate for the risks they will encounter. Moreover, it is believed that the real prices of the metal constituents to be mined would have to rise by 70 percent for a rate of return of 20 percent on such a venture.[159]

For the present, it is assumed that nodule development costs will range from between 10 percent to 400 percent more than land-based nickel mining in Ontario.[160] Even if only 10 to 20 mine sites are developed by the year 2000, this level of nodule retrieval could prove to be a threat to Canadian nickel mining. However, only if consumer governments subsidize operations can we expect commercial seabed mining before 1990.[161]

The pursuit of ferromanganese nodules is really the pursuit of nickel and

cobalt, and secondarily copper and manganese. In 1977 prices, about 70 percent of the nodule value comes from nickel. Nevertheless, because two politically unstable African countries dominate world production of cobalt, there is some pressure to get the nodules at any cost. Due to the military disruption in Shaba province in Zaire in 1978, cobalt production fell off rapidly and, as a result, the price of cobalt rose 320 percent that year. Mine production in Zaire dropped to 1971 levels and in Zambia to 1966 levels.[102]

A potential market for nodules involves their use in a process to separate metals such as vanadium and nickel from alternative sources of oil such as oil-bearing sands and heavy oil. Researchers at Mobil Research Development Corporation argue that the porosity of the nodules allows them to act as a 'potentially inexpensive porous seeding surface for the thermal noncatalytic decomposition of the metals.'[103] What this means is that utilization of the nodules in the demetalization of alternative sources of oil is potentially commercially attractive, if cost considerations can be overcome. As the price of conventional oil rises and the development costs of heavy oil and oil sands become more competitive, it is likely that the countries with these alternative oil sources (USA, Canada, Venezuela, USSR) will have an additional incentive to look favourably on the development of nodule mining.

There are various estimates (not premised on any stated rate of nodule production) that by the year 2000 the major developed countries could achieve near or complete self-sufficiency in the nodule metals through ocean mining. These include the following forecasts:

i the USA, Japan and Europe could almost become self-sufficient;[104]
ii the USA could be self-sufficient and a net exporter of cobalt, and could cut manganese imports by 50 percent and nickel imports by 25 percent;[105]
iii by 1990, the USA could be 98 percent self-sufficient in cobalt and manganese, 70 percent self-sufficient in nickel and 90 percent self-sufficient in copper.[106]

Whatever the accuracy of these estimates may be, there is no doubt that ocean mining will be pursued for various reasons. But aside from the problems of cost discussed earlier, there remain unresolved political problems.

Beginning with the appearance of the Single Negotiating Text in the spring of 1975, the U.N. Law of the Sea Conference made numerous efforts in search of agreement on how much of the nodules should be mined every year, how the revenues from the sale of the metals should be shared, and how the whole program should be administered.[107] On the issue of the rate of production, Canada found itself allied with a number of LDCs which wanted limits on the amount produced each year because of the anticipated effect the competition would have on their land-based operations. Opposing them were most developed consuming countries, which wanted no production ceiling. After considerable negotiation among the conference participants on this and many other issues, a final agreement was reached in 1982.

The Draft Final Act of the Third United Nations Conference on the Law of the Sea dated 21 October 1982 contains a resolution on the Establishment of the Preparatory Commission for the International Seabed Authority and a second resolution Governing Preparatory Investment in Pioneering Activities Relating to Polymetallic Nodules. These resolutions, together with the United Nations Convention on the Law of the Sea which was signed by 119 nations on 10 December 1982, contain the main elements affecting the exploration and exploitation of the resources of the international Area (the seabed beyond territorial limits subject to ocean mining). Changes to the production policies of the convention negotiated in the late stages of the conference (in which Canada actively participated) include provision (151 j) that 'conditions of access to the markets for the imports of minerals produced from the resources of the Area and for imports of commodities produced from such minerals shall not be more favourable than such conditions applied to imports from other sources'. Provision 151 (8) states that

'rights and obligations relating to unfair economic practices under relevant multilateral trade agreements shall apply to the exploration for and exploitation of minerals from the Area. In the settlement of disputes arising under this provision, States Parties which are Parties to such multilateral trade agreement shall have recourse to the dispute settlement procedures of such agreements'.

This means that the GATT (General Agreement on Tariffs and Trade) applies to disputes; this addition to the convention had long been sought by many countries including Canada.

These provisions benefit Canada and other producers, since they provide for recourse if subsidies or restrictions on market access form part of the pattern of seabed development in the future. Production policies also allow the proposed Authority to participate in commodity conferences relating to minerals derived from the Area (Article 151: a, b, c).

A production formula intended to phase in seabed mining for an interim period of 25 years is another aspect of production policies (Article 151: 2-6). The present formula is a successor to a number of previous iterations; it requires the use of world consumption data for nickel to project a trend which is recalculated every time an application for a plan of work is made covering exploitation.

The basic elements of the formula can be simply described:

i the first operator to achieve commercial production will establish a 20-year phase-in for seabed mining, which terminates after that period;

ii once a mining contract is issued, there is no control on production under that contract;

iii the tonnages for which contracts can be issued by the International Seabed Authority are based on a 5-year period of 100 percent of calculated growth

prior to commercial production plus 60 percent of the growth thereafter (the ceiling);

iv if consumption growth is less than 3 percent, then 3 percent (a floor) will be used in the calculation (which is based on a log-linear trend of the most recent 15 years of data available);

v however, the floor tonnage many not exceed all calculated growth from a point on the trend line starting 5 years before first commercial production begins and ending in the year for which a production authorization is sought; the latter is colloquially termed the 'safeguard';

vi part of the tonnage is reserved for the Enterprise.

As seabed mining is many years in the future, substitutes for consumption data must be used to compute the tonnages that may be allowable under different assumptions. For illustrative purposes, an example follows (see table 13) which assumes a 2-percent constant growth rate and illustrates the situation that would exist if the year of first commercial production was 1990 or 1995. The formula does not apply to land-based mining nor does it guarantee a market for future seabed mining. It simply determines the tonnage during an interim period for which mining contracts can be issued.

While Canada supported a ceiling on ocean mining production because it would likely act as a stabilizing force on markets and help to deter subsidized production by the importing countries, Canada did not favour a floor, or guaranteed minimum production quota, for ocean mining. The Government of Ontario, which supported the federal position, expressed its fears succinctly about the possible impact of a floor on Ontario's nickel production:

> the guaranteed floor concept would introduce a significant element of instability into the industry and could in a very real sense become a cause of otherwise unnecessary shut-downs and high-grading of land-based operations as well as increased consumer prices for nickel products. The implementation initially by major importing states, and later internationally, of the rationing and dual pricing system necessary under the guaranteed floor formula, would present incredible difficulties.[168]

The fact that Canada failed to accomplish ratification of a nodule production agreement without a floor was a diplomatic setback. Canada's goals at the Law of the Sea Conference with respect to the mining of nodules were to protect the interests of its mining companies and the thousands of related jobs.[169] Since there is no ocean mining of any consequence now, it is premature at this date to determine whether or not Canada is achieving its goals. Many things could change between now and the time an agreement is reached on ocean mining. The Law of the Sea Treaty could be breached in the future. A civil war in Indonesia, a revolution in New Caledonia or the Dominican Republic, continued turmoil in Zambia and Zaire, or the creation of a nickel cartel that engaged in production cuts to raise prices could

TABLE 13

Example of Production Limitation: Seabed Mining

Year	A: Assumed World Nickel Consumption[a] (thousand tonnes)	B: Tonnage for Which Contracts May Be Issued With 1985 as Year of Earliest Commercial Production[b] (thousand tonnes)	C: B as a percent of A	D: Tonnage for Which Contracts May Be Issued with 1991 As Year of Earliest Commercial Production (thousand tonnes)	E: D as a percent of A
1985	843	175	20.7		
1990	931	235	25.2		
1991	950	239	25.1	156	16.4
1995	1028	316	30.7	239	23.2
2000	1135	364	32.1	274	24.1
2004	1229	480	39.0	385	31.3

Source: Effects of Production Limitation Formula Under Specified Assumptions, Report of the Secretary General, Third United Nations Conference on the Law of the Sea, A/CONF.62/ L.66, February 1981.

[a] projection of 2-percent growth on trend value line for 1979; the actual pattern of consumption and associated growth rates have a marked effect on the results.

[b] assumes commercial production takes place 5 years after the approval of a contract.

almost certainly push the production of ferromanganese nodules through the agreed ceiling.

It is also known that Antarctica possesses significant reserves of iron ore. In addition, it is estimated that large amount of oil, gas, platinum, nickel, copper, chromium, lead, zinc, cobalt and vanadium could exist on that continent or its continental shelf, because its geological formations are similar to those of South Africa, southern Latin America and Australia, where these minerals have been discovered in abundance. Nevertheless, for the remainder of this century it is highly unlikely that Antarctica will play any significant role in world mineral production, for a number of reasons: conflicting claims over mineral rights; technical problems due to the extreme climate; the inadequate geophysical and geological data base; the great distance from major markets; and finally, the adequacy of world reserves for most of the minerals likely to be found in Antarctica.[170]

Export Stabilization Schemes

One strategy that could help to turn around the mining investment trend in the LDCs is the inauguration by developed countries of compensatory financing schemes for the earnings from certain LDC commodity exports.[171] Only one such scheme specifically directed at minerals now exists, as part of an agreement between the EEC and 57 countries of Africa, the Caribbean and the Pacific (ACP). (A Japanese scheme initiated in 1975 has been terminated.) The first agreement between the EEC and the then 53 ACP countries – the Lomé Convention – was signed on 28 February 1975 and was effective for 5 years. The second agreement, Lomé II, was signed during the first week of November 1979 and became effective 1 March 1980 for 5 years. On a broad level, these agreements have included:

i free access to some of the goods exported from the ACP countries to the EEC, without the requirement that the EEC be granted similar access or reciprocity;
ii a fund to stabilize the export earnings of important commodities from the ACP countries through grants or loans;
iii financial aid provided through the European Development Fund and the European Investment Bank;
iv industrial and technological cooperation between the two groups to promote development in the ACP countries.

Nonfuel minerals are covered under two parts of the second Lomé agreement: Stabex, 'Stabilization of Export Earnings'; and Sysmin, 'Special Scheme for Minerals'.

Under Lomé I, only one mineral, iron ore, has been eligible for Stabex compensatory financing, as a special concession to Mauritania. To qualify

for coverage under the Lomé II Stabex arrangement, a commodity (except for minerals other than iron ore) must meet two requirements:

i it must represent 6.5 percent of a country's total exports to the EEC;
ii there must be a minimum decline of 6.5 percent of a country's average earnings from the commodity over the preceding 4 years.

Under the first Lomé agreement, the required percentage in both cases was 7.5; this change represents a small concession by the EEC. For the poorest countries the requirement is now 2 percent, versus 2.5 percent in the first agreement. When a country's earnings for a particular commodity fall below the minimum, Stabex funds are contributed to the country to make up the difference. The 35 poorest ACP countries receive outright grants; the remaining 22 receive interest-free loans. Under the new Lomé agreement, these loans are to be repaid over 7 years, beginning 2 years after the country's earnings from the commodity have recovered to a point at or above the minimum decline in earnings.

The second area where minerals receive attention in Lomé II comes under the umbrella of Sysmin's industrial cooperation agreement. The first Sysmin agreement covers copper, cobalt, phosphates, manganese, bauxite and tin. Eventually iron ore will lose its Stabex status and become part of the Sysmin arrangement at some unspecified time in the future. A fund of $370 million has been set up for Sysmin officials to disburse. To be eligible for financing there are three qualifications a country must meet:

i the mineral in question must represent at least 15 percent of its exports to the EEC (10 percent for the poorest mineral exporters);
ii the earnings from the mineral export must drop by more than 10 percent of the average of the previous 4 years;
iii total production must be endangered by some form of crisis (as was the case in Zaire after the invasion of Shaba province by Katangese rebels in 1978), and production must be cut at least 10 percent.

When conditions ii and/or iii are met, the exporting country is eligible for loans from the fund at 1 percent interest with repayment over 40 years.

The second part of the industrial cooperation package concerns insurance for mineral investment in the event of expropriation. The insurance will be paid for out of the EEC's budget. There are other provisions for technical assistance and risk capital for mineral development. So far, most individual governments in the ACP nations have yet to offer guarantees for cooperation on new mineral development programs, although some individual arrangements have been struck between Britain, West Germany and some ACP countries.

The Stabex-Sysmin arrangement can be viewed as the beginning of preferential access to LDC mineral supplies for the EEC consumers.[172] It is

possible that other minerals could be added to the Sysmin list in future agreements. In negotiations leading up to Lomé II, West Germany tried unsuccessfully to have lead, zinc and tungsten made eligible for compensatory financing.[173] The motivation for the European Economic Community's agreement to Stabex, both originally and subsequently, can be found in its concern over commodity shortages during the 1972-74 commodities boom, and the decline in investment in the LDC mineral projects by EEC mining companies noted earlier.

During the life of the first Stabex there was some concern that the EEC-ACP agreement could reduce Canada's status as an 'attractive place for mineral investment' and diminish its competitive ability.[174] However, the general consensus was that the Stabex program had little impact on Canadian trade in minerals. Nevertheless, at the time there was concern that Stabex could be more harmful to Canadian interests if copper, lead and zinc were added to the list.[175] With the creation of Sysmin, and the addition of copper and cobalt to iron ore, Canadian interest in the EEC-ACP accord has sharpened. Of these three minerals, government officials now concede that iron ore is the most likely to be affected, in terms of investment in Canada and access to the European market. However, to put things in proper perspective, there is greater concern that competition from exports of iron ore from Australia and Brazil, neither of which is part of the Lomé agreement, presents the greater threat.

As for copper and cobalt, there is more uneasiness about the potential effect of ferromanganese nodules on Canadian export markets than there is for their inclusion in Sysmin.[176] Nevertheless, in the case of the Lomé Convention, Canada is an outsider looking in with concern but unable to defend its interests.

Stockpiling: United States, The European Economic Community and Japan

The United States first initiated a governmental stockpile with the passage of the Strategic Materials Act of 1939. The commodities involved were rubber, tin, quartz crystals, and chromium. The value of these resources was $70 million.[177] With the enactment of the Strategic and Critical Materials Stockpiling Acting in 1946, and the Defence Production Act of 1950, the USA was committed to a comprehensive stockpiling system for minerals and other commodities. The value of the stockpile has fluctuated over the years, depending on how much was sold or bought, government objectives for each commodity, and inflation. In 1962 the value of the stockpile was $8.7 billion; in 1973, $4.6 billion; in 1978, $8.9 billion; and $11.0 billion in 1982.

During the Truman administration and for part of the Eisenhower years the stockpiled commodities were expected to meet U.S. domestic needs under wartime emergency conditions for 5 years. Eisenhower temporarily reduced this time objective to one year, then raised it to 3 years. It remained at 3

years until President Nixon reduced the time frame again to one year in 1973. Under Presidents Ford, Carter and Reagan the objective once again became 3 years.

The fluctuations from 5 to 3 to 1 to 3 years for the stockpile reflect differing assessments by different administrations of the total volume of minerals and other commodities needed over the period of time to underpin orderly U.S. mobilization efforts to fight overseas in one major war and one minor war. It is, however, another matter when it comes to the stockpile objectives for individual minerals. Strictly speaking, the strategic and critical materials stockpile can legally be used for no other purpose but for preparation for defence of the United States in the event of war. In practice, however, many factors have come into play to account for fluctuation in the stockpiles of individual minerals:[178]

- the encouragement of domestic mining industries (purchases);
- the protection of domestic mining companies from the competition of imports (purchases);
- the provision of an artificially buoyant market in time of depressed prices (purchases);
- balancing the budget (e.g. sales of copper in 1973);
- fighting inflation by controlling prices (silver and copper sales, 1965, 1966, 1973);
- improving the balance of payments, 1973;
- vote-trading with Senators on the Panama Canal issue (copper purchases).

The traditional justification for a consuming nation like the United States to hold a stockpile for nonenergy minerals rested upon the need for preparedness for war. As time has passed and the political environment and weapons technology have changed, this justification has remained. Meanwhile, the causes of supply disruption have multiplied, and now include:

- intentional withholding of supplies by the producing nation to gain a higher price;
- loss of diplomatic and trade relations because of a revolution in the producing country;
- termination or disruption of supplies because of civil war or regional war affecting the supplier;
- interruption of supply because of strikes or natural disasters;
- world public opinion enforcing some degree of sanctions on the producing nation that causes the termination of supplies or a costly rerouting to avoid detection (e.g. Rhodesia).

During the Eisenhower administration, the *raison d'être* of the stockpile was changed for one year, from a purely wartime rationale, to one based on the nation's industrial needs. By the late 1970s pressure was building on the Carter administration to base the stockpile on the degree of U.S.

accessibility to foreign minerals.[179] The major change made by President Carter was the mention of the time lag needed to be overcome before military demand was met: 'we want to get into our first readiness posture by preparing for a 1-year NATO war in Europe with no more than 30 days warning'.[180] Earlier, under the Ford administration, new stockpile objectives had been set and, 'for the first time, wartime civilian economic requirements were to be provided for; they were to be explicitly and separately estimates from military requirements.'[181] This policy was continued by Presidents Carter and Reagan.

Throughout the postwar period, Canadian officials through contacts in the State Department have 'successfully minimized' any adverse effects that U.S. stockpile disposals might have had on the Canadian mining industry;[182] in fact, some mining companies in Canada have actually benefited from the U.S. stockpile. Special contracts with Falconbridge (at a premium rate) for nickel in 1948 enabled that company to establish itself as a major competitor to Inco, something the U.S. government wanted to see. Inco and Sherritt Gordon have also benefited from stockpile contracts.[183] Similarly, Alcan's aluminum operations received a big boost in the early 1950s through stockpile contracts. In general, the U.S. stockpile has been used to encourage competition and stabilization of prices (e.g. zinc and tin).[184] Further, the stockpiles 'have not been used for deterrence against foreign price gouging, but that potential ... is there.'[185]

What is the nature of this potential deterrence in regard to Canadian-produced minerals that are of significance to the U.S. market? As of 31 March 1982, the total value of the stockpile was $11 billion. Six minerals (aluminum metal group, chromite-chromium, tin, tungsten, silver and cobalt) accounted for 60 percent of this value ($6.6 billion), and tin and chromite-chromium for 43.5 percent of the total. If industrial diamonds, manganese and titanium sponge are added to the six, the percentage rises to 72.5 percent.[186] For most of the minerals in which Canada has some leverage with the United States there are no significant stockpiles.[187] Cesium, selenium, and potash are not stockpiled. Nickel stockpiling was terminated in 1972, but has been revived recently, and by the end of 1981 there was an amount equivalent to 2 months' total domestic consumption in stockpile. At the same time there was about one month's supply of asbestos (of the kind that Canada exports to the USA) in the stockpile. The stockpile also contains more than one year's supply of tantalum, more than 3 years' supply of cobalt, about 3.5 months' supply of zinc and about 4 months' supply of columbium of all grades.

It appears that the U.S. administration has returned to barter arrangements as one way of acquiring critical raw materials for the stockpile in exchange for surplus American agricultural commodities. Such a program existed between 1950 and 1967 and involved purchases of 'approximately

60 strategic materials, with a value of over $1.2 billion, from more than 50 countries...' This program appears to have begun again with the 25 February 1982 purchase by the U.S. government of $67.5 million in bauxite in return for milk-based agricultural products, excess strategic and critical materials, and cash.[188] If this program is expanded, as seems possible, Canadian companies might have a more difficult time landing contracts to supply the U.S. stockpile.

As of 1982 there is no EEC-coordinated stockpiling facility for nonenergy minerals. Suggestions that such a mechanism should be created have come from both private companies and European Community officials in Brussels. For the moment, the creation of stockpiles is beyond the capability of most of the individual members, but each country wants to pursue its own path. France is the only EEC member to have an established government stockpile, while West Germany and Britain have tended to leave the problem to the private sector.

The French government stockpile, controlled by Groupement d'Importation et de Repartition des Metaux, began in 1975 when $5.5 million was spent to stockpile mainly copper and nickel.[189] The goal was to have sufficient supplies to cover import needs for 2 to 3 months.[190] By 1978 the stockpile had reached a value of $75 million and in early 1979 the government announced plans to spend another $175 million. It is expected that by the end of the 1980s the total value of the stockpile will have reached $700 million. Much secrecy surrounds purchases for the stockpile, but it is believed that the new acquisitions centre on antimony, cobalt, chromium and zirconium as well as platinum, vanadium, titanium and manganese. These acquisitions reflect French government concern over developments in Zaire, Zambia, Zimbabwe-Rhodesia, Namibia and South Africa as well as the growth in the French nuclear and defence industries.[191] Of all the minerals imported from Canada, only in the case of nickel is there any existing stockpile supply.

In West Germany no government stockpile exists. However, early in 1979 Bonn announced plans for tax incentives and a revolving credit totalling $327.6 million for domestic companies to develop a year's supply of cobalt, manganese, vanadium, asbestos, chromium, tantalum, platinum, antimony and tungsten. This program reflected West German concern with the security of supply in Africa. The government's intention was to have the purchases begin in 1980 or 1981 and run through to 1985. This program has been terminated for reasons of austerity.[192]

In February 1983 Britain announced that it would create a government stockpile of strategic minerals (cobalt, chromium, manganese, and vanadium). $77 million (U.S.) will be spent to develop a 3-month supply of these minerals. Another factor which benefits Britain is that London is still the world's major centre for mineral commodity trade (the London Metal Exchange), and therefore is the location of large amounts of privately

stockpiled minerals (e.g. aluminum and copper).[193] In addition, '...the government has helped to secure copper and cobalt supplies for Britain through two special trade agreements with its former African colony, Zambia.'[194] As is the case in France, there is an abiding concern about the security of supplies from central and southern Africa.

The idea of stockpiling minerals through government and corporate cooperation began to be taken seriously in Japan for the first time in 1972. The minerals considered for stockpiling were zinc, copper and lead. No immediate action was taken. Early in 1973 the Japan Wrought Copper Council proposed the creation of a national stockpile. Later that year, the Ministry of International Trade and Industry (MITI) took up the cause and suggested a stockpile for nonferrous metals (again mainly copper, lead and zinc) and for other critical minerals: mercury, tin, antimony, nickel, aluminum. Again, nothing came of this.

MITI's advocacy of a stockpile continued into 1974 but on a more modest scale, when it proposed a stockpile to consist of one month's supply of copper, lead, zinc and nickel.[195] It was jointly financed by the government and industry when it came into effect in April 1976.[196] The contents of the stockpile were copper, aluminum and zinc. By 1979 copper stocks were adequate for 15 days' demand, zinc for 35 days. In addition, foreign exchange allowances were provided by the government for nickel imports.[197] In spite of the original motivation of having a domestic buffer stock against possible disruption, the stockpile has been used partly to subsidize domestic processors' inventories of metal during periods of depressed prices (zinc, for example) and 'partly to reduce the embarrassingly large trade surplus.'[198] By 1979 much of the stock was being sold off as prices rose.[199]

Of those minerals exported to Japan in which Canada has significant leverage (nickel, asbestos, potash), there is no official stockpiling. While private sector stockpiles exist, they are usually built up in periods of slack demand. An exception to this is Kawasaki Steel Corp.'s permanent stockpile of iron ore, enough for one and a half months' supplies.[200] This brings up another important point. If one takes into consideration supplies which are in the pipeline (i.e. on ships and freight cars) and inventories of intermediate and end-product users, the advantages of importing countries are obviously increased. More research is called for in this area.[201]

Substitution

Table 14 reveals that, of the nine minerals for which Canada may have some leverage with its major trading partners, it is only in one case that this leverage is not diminished by substitution. There are no substitutes for potash in its overwhelmingly dominant use, as an agricultural fertilizer. For those minerals which are affected by some substitution or where substitution involves

TABLE 14

Degree of Substitution for Some Minerals Where Canada has Potential for Bargaining Leverage with its Major Trading Partners

Mineral	Degree of Substitution			Substitution Involves		
	Some	None	Major	Increased Cost	Sacrifice of Technical Efficiency	Neither
Potash	—	x	—	—	—	—
Nickel	x[c]	—	—	x	x	—
Asbestos	x	—	—	x	x	—
Columbium	—	—	x[e]	—	—	x
Cobalt[a]	x[d]	—	—	x	x	—
Selenium	—	—	x[f]	—	—	x
Zinc[b]	—	—	x[g]	—	x	—

Sources: P. Crowson and S. Francis, *Non-Fuel Minerals and Foreign Policy: Data Base*, (London: Royal Institute of International Affairs, 1977); T. Mahlde et al., *Towards a Nickel Policy for the Province of Ontario*; Bureau of Mines, *Mineral Commodity Summaries*, 1970, 1976, 1982; *Mining Journal*, 3 January 1975; *Northern Miner*, 4 May 1978. Department of Energy, Mines and Resources, *Potash*, 1982.

[a] Due to the disruption (1979) of production in Zaire, substitution efforts for cobalt have been intensified and have had a significant impact in certain end-uses such as magnets.

[b] According to a study by Chase Econometrics, the worst of the substitution problem that has eroded markets for zinc in the 1970s is now over (*Northern Miner*, 29 March 1979).

[c] Titanium, chromium, aluminum, plastics, vanadium, manganese, platinum, copper, cobalt, molybdenum (depending on use).

[d] Nickel, platinum, tungsten, ceramics, copper, chromium, barium, strontium ferrite, molybdenum carbide, manganese (depending on use).

[e] Vanadium, manganese, molybdenum, titanium, zirconium, tantalum, tungsten, ceramics (depending on use).

[f] Silicon, germanium, cadmium salts, zinc oxide, tellurium, bismuth, lead.

[g] Aluminum, plastics, magnesium, titanium, cadmium, zirconium (depending on use).

increased cost or a sacrifice of technical efficiency, asbestos shows the least loss of leverage. However, environmental and health concerns have led to increased efforts to find substitutes for asbestos which may lead to loss of markets in the future.[39] Substitution for nickel and cobalt indicates a greater loss of leverage than for asbestos but, for the present, the impact of substitution on nickel and cobalt is not significant.

The minerals which show the greatest loss of leverage are columbium, selenium, and zinc. It is not possible to quantify the nature of the impact of substitution because studies are scarce in this area. A study by Kidder Peabody and Co. of the United States noted that the use of zinc by the automotive industry (a major area of end-product use) declined 43 percent

TABLE 13

Recycling of Minerals where Canada has Potential for Leverage with its Major Trading Partners
(as a percent of total apparent consumption)

Mineral	United States	EEC	Japan
Asbestos	0	0	0
Columbium	minimal	minimal	minimal
Nickel	23	n.a.	n.a.
Potash	0	0	0
Zinc	10[a]	30	n.a.
Cobalt	10	minimal	n.a.
Selenium	1 to 18	39	n.a.

Sources: B.W.K. Birch, *'The Raw Material Supply of the European Community'*, p. 186; Bureau of Mines, *Mineral Commodity Summaries*, 1979, 1982.

Notes: n.a. = not available.

[a] Varies with the price.

between 1977 and 1980 as lighter minerals and plastics were used to create better fuel efficiency.[300] Substitution is obviously an area where detailed research is necessary.

Recycling

Of the nine major minerals for which Canada may have some leverage with its major trading partners, only asbestos and potash are not adversely affected by recycling, since they cannot be recycled (table 15). In the cases of cobalt and columbium, there is little reduction of leverage. The minerals which show the greatest reduction of leverage due to recycling (in descending order) are selenium, zinc and nickel.

3. The Resource Diplomacy Debate in Canada

Historical Background

The debate about the purpose to which Canada should put its mineral resource potential has a history of almost a hundred years. In 1891, Premier Mowat of Ontario was engaged in extensive efforts to interest the British Admiralty in Canadian nickel reserves. In a letter to the Admiralty he wrote:

> As a colony of Great Britain and as a part of the British Empire, our province is concerned in all things which contribute to the greatness and stability of the parent state, and recognizing especially how much depends upon the maintenance of her historic position as a naval power, it would be agreeable to our people that the legislature should further in any way consistent with its obligations to the Province and the people of the Province, the means whereby that position may be more effectively safeguarded and preserved.[20]

The reason for the great concern by Mowat was the recent discovery that nickel-steel plating on battleships gave a navy a decisive advantage against enemy firepower, if the enemy did not have such plating. In a more nationalistic vein, Sir Charles Tupper, then the High Commissioner to London, was one of the first to give shape to a Canadian dream of playing a more powerful role in international affairs:

> Why cannot Canada herself make this nickel steel? (At the time, the new alloy was being made in the usa). Could not the iron mines of Hastings County be linked up with the nickel mines of Sudbury in making nickel-steel and armour plate on Canadian territory? If the government took the proper action, there (is) no doubt that the best skill and strongest financial backing in England could be had to carry it out. It really looks as if it were possible for Canada to control the character and efficiency of the guns and navies of the world.[21]

The contrasting visions of Canada's role as a mineral supplier to the world, Mowat's faithful supplier versus Tupper's ambitious commander, have become the poles of contention around which modern day debate revolves.

In *Silent Surrender*, Kari Levitt posed the hypothesis that Canada is a powerless satellite of the United States and that possession of mineral resources cannot provide Canada with a power base until it rids itself of American mining companies and economic domination by the United States in general:

Present-day Canada may be described as the world's richest *underdeveloped* country. Its regression to a state of economic and political dependence cannot possible be attributed ... to an unfavourable endowment of resources ... Thus, we are forced to seek the explanation of underdevelopment and fragmentation in the institutions and processes of modern society. We suggest it is to be found in the dynamics of the New Mercantilism of the American International Corporations.[208]

One of the reasons why Levitt might have come to this conclusion can be found in a statement of *The Task Force on the Structure of Canadian Industry:*

The overall level of foreign ownership in Canada is significantly higher than that for any other economically developed country and higher than for most of the underdeveloped countries.[209]

But this neither confirms nor denies Levitt's hypothesis. James Eayers has taken a position opposite to Levitt's. In an article entitled, 'Canada's Emergence as a Foremost Power' in the journal *International Perspectives*, he proclaimed a new era in international relations that is predicated on the shift in the balance of power from the resource-importing countries to the resource-exporting countries. He stated that the capacity of resources to confer power is superseding the capacity of technology to confer power.[210] This shift implies several things for Canada, he maintained. First, 'it means that Canada is exceptionally well endowed to face the worst (short of nuclear war) the future may fling at mankind'. Extrapolating from the position, he announced that 'we have what it takes since we have all it takes'. Finally, he suggested that the shift in the power balance gives Canada a great deal of unilateral discretionary power. Thus, speaking of minerals in particular, he said: 'we need only decide how fast to develop them, how much to charge for them'.[211] It is quite evident that Levitt and Eayers perceive the same world in different ways. Which perception is more accurate? Or are both perceptions inadequate renderings of reality? What does the possession and trade of minerals mean for Canada?

A shift in the balance of power between mineral exporting and importing countries is indeed under way. Yet despite this change, it would be foolhardy indeed to suggest that all mineral-exporting countries have advanced equally. In fact, the power shift has been uneven overall and nonexistent for many countries.[212] Thus, it is necessary to ascertain those factors which have favoured the exporting countries and those which have constrained them from obtaining greater advantage. Such an investigation is quite critical, for it will, by extension, help to inform a nation's strategists about the consequences, positive or negative, that follow from a particular policy that relates to minerals. As Moran has observed in his study of Chilean mineral policy, the lack of an informal and carefully delineated policy can have adverse consequences.[213] This study therefore explores the potential for Canada to wield international bargaining power based on its possession and trade of mineral

resources, either through unilateral measures or through action in concert with other producing countries.

Ottawa's international policy has traditionally been to rely on market forces first and, when some form of intervention is deemed necessary, to prefer producer-consumer groups over producer groups so as to obtain a 'balance of rights and obligations' in international trade, and to take into consideration

> the limited ability of the world economy to react instantaneously to large shocks in the form of doubling or trebling of resource prices.[212]

In its 1970 foreign policy review, *Foreign Policy for Canadians*, however, Ottawa began to show an interest in the role of minerals in foreign policy that differed somewhat from previously published attitudes:

> in an era of heavy demand for energy and other resources, the cards are by no means stacked in one hand.[213]

Opportunity seemed to be present, and this led to the conclusion that Canadian minerals are potential catalysts to achieve objectives, be it national or international.[214] In particular, this meant a feeling of increased leverage *vis-à-vis* the large industrial countries in regard to Canada's goal of increased mineral processing prior to export. On a more general level, it was said:

> it would seem that Canada has an increasing role to play in world affairs because of our good fortune in having a large mineral endowment.[215]

It was statements like these, amidst the panic and euphoria of the early 1970s boom in commodity prices, and in particular after the over oil price quadrupling in the fall of 1973, that encouraged James Eayers' excessive optimism about Canada's being a mineral-based 'foremost power', and also stimulated critics to call on Ottawa to throw in its lot with the producers' associations and abandon support for the idea of producer-consumer groups.[216] For the critics, Canada's bargaining strength could only be improved if it joined other producers.

The Canadian mining industry is generally opposed to any organization which excludes consumers and, in fact, usually goes only as far as supporting study groups (although occasionally there is wavering among some of the copper producers). The uranium producers do not offer comments on this matter, perhaps because their actions speak for themselves, but also because they have been subject to a gag law. In general, however, the Canadian mining industry holds to the position that producer associations create market distortion and, by and large, are remarkably unsuccessful. Further, industry spokesmen attempt to prick the 'myth' that Canada has bargaining power because of its resources:

> perhaps the most dangerous nonsense of all is that Canada has some sort of monopoly on natural resources with which it can hold the rest of the world to ransom and obtain

a preferred position in international trade.[207]

This view was endorsed by a former executive director of the Centre for Resource Studies at Queen's University: 'there are signs of more widespread acknowledgement that Canada's 'resource power' is a thing of the past, if it ever existed.'[208]

A large part of the rationale for supporting participation in producer associations can be found in the nature of the international market for minerals. According to the former U.S. special representative for trade negotiations, Harald B. Malmgren, when speaking of world trade in minerals, it is difficult to support the contention that free competition exists: 'to find completely unfettered competition at work one needs patience and a large magnifying glass.'[209] In particular, multinational corporations engage in oligopolistic pricing for minerals and preempt the market through vertical integration. Long-term contracts can have the same effect as vertical integration, if the consumers bind together (as is the case in Japan), and if there is no indexation of inflation in the contracts. To be more specific, the world market prices for aluminum, asbestos, sulphur, uranium and potash are set through oligopolistic pricing by multinational corporations (MNCs). The same is true for the American, Canadian and South American prices of copper and zinc, and for the European price of zinc. Oligopolistic pricing for nickel and molybdenum has been the case until recently. However, given the existence of many producer/sellers in the current weak demand situation, oligopolistic pricing has generally not been possible. Long-term contracts are evident in trade for copper, iron ore, coal, manganese, bauxite, uranium and so forth.[210]

Analysts such as Malmgren and Harris, while not proposing the utilization of producer associations and not having an unbounded faith in resource diplomacy, argue that MNC control of markets fails to ensure adequate benefits for the host country, including more local processing. Industry counters with the argument that, when corporations control the prices of minerals such as nickel or aluminum, these prices exhibit remarkable stability.[211] Both arguments have some validity, and this indicates the nature of the trade-offs to be made. Other factors which prevent 'unfettered competition' include the tariff and nontariff barriers of consuming countries, U.S. stockpile activity, and the existence of special preference by the industrial countries (mainly the MNC) for LDC producers over those in Canada and Australia.

Many problems tend to be overlooked by those who advocate participation in producer associations. Each member faces similar problems but of different dimensions. Each has different costs based on different ore grades and by-product minerals, and on different levels of efficiency. Thus, each will likely have different interpretations of the required price. Each country has distinct foreign currency requirements and employment problems.

Further, there is the dilemma of how to share windfalls, and how to share production cut-backs in the event of recession.[22] Similar problems face producers which want to join or have joined an international commodity agreement.

Since Canada is a rich, developed country, and since it is one of the world's most efficient producers of minerals, there is a strong likelihood that Canadian participation in an association dominated by LDC members would result in Canada's being forced to make disproportionate sacrifices. Further, Canada would likely face stiff opposition from its largest customer, the United States, while U.S. corporations in Canada that were involved would face sanctions under American antitrust laws if the U.S. market were affected or perceived to be affected. In addition, provincial governments, which have recently been asserting more control over minerals in their jurisdiction, may oppose any federal commitments to an association that would jeopardize future investment, production, employment and tax revenues.

Other points bear equal consideration. Since the majority of mineral production in the noncommunist world is located in developed countries like Canada, the United States, Australia and South Africa, the increase in prices due to producer combination would benefit these countries and hurt those LDCs which are nonproducers (shown in appendix III). While the share of world mineral imports of less developed countries is rising but not substantial, the impact of a price rise would be considerable on some countries, particularly those that are beginning to develop more manufacturing facilities, or are increasing crop yields, in the case of LDCs that are importing phosphates.

While it is true that U.S. companies face sanctions in the form of antitrust laws if they participate in cartels that fix prices in the American market, this has not prevented American companies from complying with LDC directives. In the case of the uranium cartel, foreign corporations operating in Canada were forced to comply with directives from Ottawa. However, it must be noted that they did not shrink from the chance of earning higher profits.[23] In general, foreign ownership should not be considered an insurmountable impediment to Canada's participation in a producer association. But the participation of American corporations operating in Canada in a producer association which affects the American market price may dampen the prospects of the producer association's success.

It is still too early at this point in the discussion to draw conclusions about the adequacy of Canada's policy on participation in producer associations, and about the potential bargaining strength of Canada resulting from its possession and trade of minerals. While some of the commentators we have referred to were quick to decide that Canada did or did not have bargaining power because of its possession and trade of minerals, none sought

to marshall detailed evidence to prove the case. Accordingly, our efforts in this chapter will concentrate on the marshalling of such evidence.

A Preliminary Assessment of Canada's Advantages

Foreign investment in Canadian minerals has arisen from a number of reasons. First, and most important, most industrialized nations need to import a large percentage of their mineral supplies. However, while Canada does possess a wide array of minerals in large quantities, this alone is not enough. It is the overall package of advantages that attracts both foreign and domestic investors. In recent years, the overall value of this package in the eyes of such investors has been tarnished by various factors (e.g. the controversy concerning the Foreign Investment Review Act, the National Energy Policy, and federal-provincial tax disputes).

Nevertheless, Canada remains one of the most favoured countries for mineral investment. It possesses some of the best expertise of its kind in the world (prospectors, geologists, engineers, geochemists, diamond drillers, contractors, etc.). In fact, this expertise is widely exported to other parts of the world. Canada's geoscience data base is one of the best in the world. Next, Canada has a highly developed infrastructure, and governments that have a commitment and the financial resources to improve it. Such infrastructure includes railways, highways, harbours and ocean port facilities, communications, and schools. Also available is a diversified energy base with potential for greater production and self-sufficiency (hydro-electric power, oil, gas, coal, uranium, tar sands and heavy oil). In contrast to many mineral-exporting countries, Canada has a high degree of political and economic stability, generally competitive tax systems, a general willingness on the part of governments to cooperate with private enterprise, and a level of productivity that is comparable to or better than that of other producing countries. Finally, with a few exceptions, Canada has offered and continues to offer security of land tenure. In addition to these factors there are others which have helped to attract American investment in particular: geographical proximity; common language (except for French-speaking parts of Canada); a similar culture; and a spirit of cooperation arising from common wartime undertakings.

It is inevitable that the vast array and extensive nature of Canada's mineral deposits would attract foreign investment. To some extent, Canadian investors have been afraid or lacked the expertise to take on the risks of initial exploration and development characteristic of the mining industry (for example, in the case of potash and asbestos). In some instances, there was insufficient capital available in Canada at the time of initial development; by and large, this was true of the development of iron ore in Newfoundland and Quebec. But is is also true that the Canadian market for minerals is relatively small compared to the export market. Thus, in many cases

guarantees of market access were necessary for development and more often than not these guarantees could be provided by foreign investors alone.

If we use the measure of foreign control as being equivalent to ownership of 50 percent or more of a firm's assets, we find that in the nonfuel mineral sector 48.5 percent of all assets was controlled by foreigners in 1965, 51.5 percent in 1968, 51 percent in 1971, 58 percent in 1973, 57 percent in 1975, 51 percent in 1977 and 47 percent in 1978.[224] Another measure of foreign interest is to estimate ownership of equity alone. According to Patton, ownership of equity in the Canadian mining industry as of 1974 was as follows: Canadian private sector, 52.7 percent; U.S. interests, 37.7 percent; other foreign interests, 8 percent; and Canadian Crown corporations, 1.3 percent.[225]

Although this aggregate analysis is a helpful beginning, it leaves one curious about 'who owns what' in various sectors of the mining industry in Canada. Such information, it appears, has not been presented previously in tabular form. An attempt to correct this omission appears as table 16. Some of the figures used in the table should be treated with caution, as they are approximations.

At the time for which the data are available, it appears that foreign ownership was most evident in the titanium, asbestos, iron ore, cesium and tantalum sectors. American equity was most apparent in the titanium, asbestos and iron ore sectors, and Canadian in the columbium, zinc and potash sectors. In general, European equity was quite small.

Canada's International Position

How has Canada fared in the past decade or so in its standing in world mineral production? Table 17 gives us some insight. From 1963 to 1981 Canada maintained its status as the world's leading nickel and zinc producer. Over the same period, Canada has also maintained its rank for uranium, selenium, sulphur, aluminum, tellurium, lead and silver. A drop in rank was noted for the platinum group, asbestos, cobalt, gold, bismuth, magnesium and iron ore. An improvement in rank is evident for gypsum, ilmenite and copper, while the biggest improvement was for potash, columbium, molybdenum and tantalum. However, mere numerical ranking is not a good indication of Canada's relative strength in bargaining power because so many other factors are involved. Nevertheless, table 17 does help to point us in the right direction. In general, the table reveals that Canada's strength in possessing a diversity of minerals has been maintained into the 1970s in spite of growing international competition for many minerals.

When we review Canada's bargaining power with respect to individual minerals, we must look at the markets for Canada's exports so that we can break the question down into its relevant parts. First, however, it is necessary to understand whether or not Canada's mineral exports have continued to show strength in the international marketplace. In table 18 we have surveyed Canada's rank in noncommunist world markets for 13 minerals in 1971 and

TABLE 16

Ownership of Equity in Canadian Mining Sectors, Various Years (as percent of total Canadian sector)

	Canadian Owned	*U.S. Owned*	*European Owned*	*Total Foreign Ownership*
Iron ore[a]	25.8	70.5	0.7	82.8
Copper[b]	50.0	—	—	50.0
Asbestos[c]	22.0	72.0	6.0	78.0
Potash[d]	59.4	40.6	0.0	40.6
Tungsten[e]	17.0	42.0	—	—
Zinc[f]	67.5	—	—	32.5
Titanium[g]	0.0	100.0	—	100.0
Cesium[h]	25.0	—	—	75.0
Tantalum[h]	25.0	—	—	75.0
Platinum group[i]	54.0	46.0	0.0	46.0
Nickel[i]	54.0	46.0	0.0	46.0
Columbium[j]	90.0	0.0	10.0	10.0

Sources: see notes below.

[a] Figures are for 1978; Energy, Mines and Resources, *Mineral Policy: A Discussion Paper.*
[b] Figures are for 1977; Annex to federal contribution to seminar on *Canadian Perspective on Commodities.* A clear delineation of foreign and domestic ownership of copper production in Canada is hampered by the significant degree of by-product production of copper.
[c] Figures are for 1982; G.O. Vagt, *Asbestos;* personal communication.
[d] Figures are approximate. Figures are for 1979; Saskatchewan Mineral Resources, *Annual Report,* 1979.
[e] Figures are for 1975; *Mining International Yearbook,* 1975. Totals are unknown. Amax (a U.S. company) controls 42 percent of the only producer in Canada, and Donie Mines (Canadian) controls 17 percent.
[f] Figures are for 1976; K.S. Rachamalla and D.H. Bell, *Towards a Zinc Policy for the Province of Ontario.* The figures are approximate.
[g] Figures are for 1978; *Northern Miner,* 11 May 1978. The only Canadian producer, QIT, is owned 2/3 by Kennecott Canada Ltd. and 1/3 by New Jersey Zinc.
[h] Figures are for 1979; *Mining International Yearbook,* 1975, p. 536; *Globe and Mail,* 13 October 1979; *Northern Miner,* 8 November 1979. The only Canadian producer of cesium and tantalum was Tanco, which closed indefinitely in 1982. Tanco is owned by the Government of Manitoba (25 percent), Hudson Bay Mining and Smelting (37.5 percent), and Kawecki Berylco Industrial (37.5 percent).
[i] Figures are for 1979; T. Mohide et al., *Towards a Nickel Policy for the Province of Ontario; Northern Miner,* 22 August 1974; *Globe and Mail,* 26 September 1979. Figures are approximate.
[j] Figures are for 1982; Department of Energy, Mines and Resources, *Canadian Mineral Survey.* The only producing company, Niobec, is owned by the Quebec Crown corporation, Soquem (50 percent) and by Teck Corporation (50 percent). Teck is a Canadian-controlled company which is approximately 19-percent owned by Metallgesellschaft of West Germany.

1979. In general, Canada's share of this international market has remained stable at about 25 percent of total exports. However, this stability masks considerable fluctuation for some minerals. In this period Canada's share of noncommunist world zinc exports was up 22 percent, potash 182 percent, sulphur 120 percent, silver-platinum 31.6 percent, iron ore 13 percent, and tungsten 86.8 percent.

TABLE 17

Canada's Ranking in World Production, by Mineral, for Selected Years

Rank	*1963*[a]	*1974-76*[c] *(average)*	*1981*[e] *(estimated)*
1	nickel asbestos platinum group zinc	nickel zinc asbestos potash silver tantalum	potash zinc tantalum[f] nickel
2	uranium cobalt selenium sulphur	columbium selenium molybdenum sulphur titanium[b] uranium	asbestos sulphur uranium titanium[b] gypsum columbium selenium
3	aluminum gypsum gold tellurium titanium[b]	aluminum copper lead platinum group gold[d] gypsum[d]	aluminum platinum group tellurium[f]
4	lead silver bismuth magnesium	iron ore cadmium mercury	gold lead copper cadmium silver cobalt
5	copper iron ore	cobalt tungsten	magnesium
6	—	—	iron ore tungsten bismuth

[a] *Source: Journal of Metals,* vol. 16, no. 7, 1964.
[b] As ilmenite.
[c] Figures are averaged for the period. *Source:* P. Crowson and S. Francis, *Non-Fuel Minerals and Foreign Policy: Data Base.*
[d] *Source: Northern Miner,* 24 November 1977 (for 1976).
[e] Figures are estimated. *Sources:* Energy Mines and Resources, internal documents, 1982; U.S. Bureau of Mines, *Mineral Commodity Summaries,* 1982.
[f] Figures for this ranking are not available for the centrally-planned economies.

On the other hand, largely due to the process of diversification that we reviewed in the last chapter, Canada's share of noncommunist world exports of nickel was down 30 percent, asbestos 22.9 percent, uranium/thorium 5.2 percent, molybdenum/niobium 42.4 percent, aluminum 53.7 percent, lead 30.6 percent, and copper 47.1 percent. Thus in some cases Canada's bargaining leverage is apparently strengthening, particularly in the case of potash,

TABLE 18

Value of Canada's Mineral Exports as a Percent of Total World Market (Excluding Centrally Planned Economies)

Mineral	1971	1979
Zinc	20.6	25.2[a]
Nickel	41.3	28.9[a]
Potash	17.0	47.0[b]
Asbestos crude, simply worked	75.1	57.9
Sulphur	21.6	46.6[a]
Uranium, thorium ore, concentrate	52.2	49.5[a]
Molybdenum, niobium etc. ores	23.3	13.4[a,c]
Aluminum	21.2	9.8[a]
Lead	9.8	6.8[a]
Copper, excluding cement copper	8.9	4.7[c]
Silver, platinum, etc.	5.7	7.5[c]
Iron ore concentrate	17.6	19.9
Tungsten ore concentrate	6.8	12.7[c]
Percent of world total	24.7	25.4

Sources: P.J. Caragata, *'Non-Fuel Minerals and Canadian Foreign Policy'*, p. 392; United Nations, *Yearbook of International Trade Statistics*, 1980.

[a] Figures are for 1980.
[b] Figure is for 1978.
[c] Estimate.

sulphur and tungsten, while at the same time it is slipping for molybdenum, aluminum and copper.

If Canada is maintaining its overall export strength but slipping or improving for various individual minerals, how is this reflected in Canada's share for nonfuel minerals in the markets of its major trading partners? Over the period 1960 to 1982, as we see in table 19, the USA has taken about 54.7 percent of Canada's nonfuel mineral exports, the United Kingdom 10.3 percent, the EEC 10.7 percent, Japan 8.4 percent, EFTA 2.9 percent and other countries 12.7 percent. The high point for U.S. dependence on Canadian minerals in the years under consideration was 1978. Since that time exports to the USA have fluctuated up and down and now rest at about 56 percent of total Canadian exports. For the U.K., dependence on Canadian minerals reached a peak in 1960 and has been dropping more or less steadily since then. 1960 was also the peak of dependence for EFTA. While EFTA's dependence grew slightly in 1980 and 1981, the growth was insignificant. In 1980 the EEC matched its earlier peak of dependence on Canada in 1960. In general, EEC dependence has fluctuated within a narrow range. The high point of Japanese dependence on Canada for nonfuel minerals came in 1973;

TABLE 19

Canada's Nonfuel Mineral Export Market by Country and Area of Destination, Selected Years
(as a percent of total value of crude and fabricated nonfuel mineral product exports)

Year	Value of Exports ($ million)	USA	U.K.	EFTA[a]	EEC[a]	Japan	Other
1960	1,564.1	48.9	22.9	5.1	11.8	3.4	7.8
1968	3,431.4	53.1	16.0	1.8	9.7	8.0	11.4
1973	5,257.7	46.9	11.3	4.1	11.1	17.1	9.5
1976	7,049.2	54.9	9.7	2.9	12.5	7.9	12.1
1978	9,207.5	60.9	6.6	1.8	9.0	8.3	13.5
1979	11,820.5	58.7	7.3	2.3	10.4	8.9	12.4
1980	15,559.0	54.3	7.9	3.0	11.8	7.9	15.1
1981	15,422.9	59.5	6.0	3.0	9.5	6.8	14.2
1982	13,052.4	55.6	5.4	2.4	11.0	7.2	18.4

Source: Department of Energy, Mines and Resources, Ottawa, 1983.

[a] excludes U.K. during the appropriate period. EFTA is the European Free Trade Association, and EEC is the European Economic Community.

otherwise, Japan's dependence on Canada has also fluctuated within a narrow range and has dropped in the last few years. The one category where Canadian exports have grown is 'other countries', with a new peak having been achieved in 1982.

These figures should provide a warning that Canada's traditional markets are diversifying their sources of supply. While the Canadian mining industry is holding its own in overseas industrial markets in absolute terms because, it appears, it has maintained its overal competitive ability, both the industry and the federal government should be concerned that there are no strong indicators of increased market penetration. This may be a sign that Canada's overall bargaining power as a mineral-exporting country has peaked.

However, a more detailed assessment of the role that certain individual Canadian mineral exports play in the total apparent domestic consumption of major trading partners shows that there are still a number of minerals which appear to offer significant bargaining leverage. If we take 40 percent of total domestic consumption as our benchmark, we see in table 20 that Canada has considerable bargaining leverage with the USA, Japan, the U.K., West Germany and France for asbestos, with the U.K. for nickel and cobalt, and with the United States for potash. If we lower the benchmark to 30 percent, then Canada also has the potential for bargaining leverage with the USA for nickel and zinc and with West Germany for zinc.

TABLE 20

Canadian Mineral Exports with Dominant Market Share, by Mineral and Importing Country

Mineral	Importing Country	1980 Imports from Canada as a Percent of Domestic Consumption[a]	1980 Imports from Canada as a Percent of Total Imports[b]
Asbestos	United States	80[c]	97
	Japan	98.9	40.1
	United Kingdom	100	76
	West Germany	100	78.3
	France	100	52.8
Cobalt	United Kingdom	100	95[d]
Nickel	United States	72[c]	46
	Japan	100	22.5[e]
	United Kingdom	100	51.2[f]
	West Germany	100[g]	18.3[h]
	France	100[g]	8.6[i]
	Italy	100	14.6[j]
Potash	United States	68[c]	94
	Japan	100[g]	—
Zinc	United States	67[c]	50[k];49[l]
	West Germany	81.3[g]	35.8[k]

Sources: Bureau of Mines, *Mineral Commodity Summaries*, 1982; *Mineral Yearbook*, vol. m, Area Reports: International, Centennial Edition, 1981.

[a] i.e.of total apparent domestic consumption of importing country.
[b] i.e. of imports of that mineral from all sources to the importing country.
[c] Estimate for 1981.
[d] Oxides and hydroxides.
[e] Metal, powder and flakes, oxide and oxide sinter, ferronickel, slurry and other.
[f] Unwrought and semimanufactures.
[g] Estimate.
[h] Matte, speiss and similar materials, scrap, unwrought, and semimanufactures.
[i] Matte, speiss and similar materials, oxides and hydroxides, and unwrought.
[j] Unwrought.
[k] Ore and concentrates.
[l] Metal.

Summary Assessment of Strengths and Weaknesses

The assessment of a country's bargaining position, its weaknesses and strengths, on any international issue must begin with the relevant linkages with other parties in the negotiation process, set within a global context. The reason for this procedure is that the strengths and weaknesses that one country possesses *vis-à-vis* another can often be counterbalanced, diminished or enhanced by circumstances within the other, or by developments occurring at the global level or at least outside the bilateral relationship.

Our analysis of the strengths and weaknesses of Canada's mineral

leverage with it major trading partners has combined a number of different approaches. In the last chapter we reviewed the following factors:

- the degree of dependence of major mineral-importing countries for specific minerals;
- the dependence of the major importing countries on specific countries or geographic regions for their mineral supplies;
- world mineral exploration and development trends;
- the diversification and procurement strategies of the major importing countries;
- the possibility of mineral development in the oceans and Antarctica;
- export stabilization schemes;
- the stockpiling practices of the major importing countries;
- current trends for substitution and recycling.

In this chapter we have reviewed:

- trends in Canada's world rank for individual mineral production;
- trends in Canada's share of world mineral exports;
- trends in Canada's mineral export markets;
- the degree of dependence of Canada's major export markets on certain Canadian mineral exports.

Table 21 combines information from both of these approaches to summarize Canada's apparent bargaining strengths and weaknesses on a unilateral basis.

Asbestos appears to be the best candidate for utilizing unilateral bargaining leverage. Importing countries are highly dependent on Canadian supplies; in fact, Canada provides about 65 percent of total world exports of asbestos.[226] As well, Canada has a large percent of world reserves and production. This leverage is further strengthened by the fact that there is no significant recycling or substitution. At the same time, asbestos is not at all likely to be affected by special preference for imports by Canada's major trading partners; only in the case of the United States is there a loss of leverage because of stockpiling, and this is not a significant loss. The greatest problems facing Canada's bargaining strength for asbestos are exports from the Soviet Union and consumer resistance due to the health effects of asbestos fibres. These problems will be discussed later in this section.

Potash also offers Canada a considerable amount of future leverage. As of 1978, Canada provided 46.7 percent of world exports,[227] and it has the best potential for increasing production to meet the growing world demand, which is anticipated to increase at a rate of 3 percent through the 1980s. There are no substitutes for potash in its overwhelmingly predominant use (95 percent of consumption) as an agricultural fertilizer. Moreover, leverage for potash is not reduced by recycling or stockpiling. Any weakening of Canada's leverage would likely come from competition from the USSR and

East Germany which together accounted for 41.6 percent of world exports in 1978. This competition could undermine Canada's current dominance in the Japanese and American markets.

Nickel has some basic leverage strengths, in that it is not easily subject to substitution, and it is not found in the stockpiles of Canada's major trading partners, with the exception of the United States and France. For the next 10 years at least, nickel will not face significant competition from ocean mining; but when that competition arises Canada's current leverage will be greatly reduced, as it has been slowly over the years due to competition from Third World exports[228] and from recycling. In general, Canada's potential for unilateral leverage for nickel must be said to be waning constantly, if not rapidly.

Although Canada is the world's largest producer of zinc, zinc is too widely available in the USA, Japan and the EEC as well as the Third World for there to be any strong leverage possibilities for Canada acting alone. Further, zinc is confronted with a loss of leverage due to recycling, and particularly to substitution in the automotive sector. An American study concluded that zinc could be a source of future Canadian leverage on the United States in the event of problems in their mutual economic relations.[229] This could well be, but in 1981 the U.S. government stockpile contained about three and a half months' supply; this would likely be sufficient to act as a deterrent to any Canadian embargo or significant price hike. Moreover, it should be remembered that there are also inventories held by consumers, as well as supplies in transit between producers and consumers. This adds to the leverage possessed by consumers in the importing country.

Canada's leverage in the case of columbium, selenium and cobalt would have be considered poor. All four minerals are subject to recycling to an important degree. Substitution for columbium and selenium is considerable. Cobalt is an exception, but it will face a significant loss of leverage if competition from ocean mining develops in the next decade. In the interim, Canada could have short-term leverage with the U.K. in the event of a curtailment of production in Zambia and Zaire. Currently, Britain has a special trade agreement with Zambia to speed up cobalt production. In the case of columbium, Brazil is by far the world's largest producer and exporter, and could easily undercut any Canadian attempt to raise prices in Italian and French markets (where Canada currently has leverage) or to cut prices and capture new markets. With the United States, Canada's potential bargaining leverage is further reduced because of significant supplies in the government stockpile for columbium, selenium and cobalt.

If Canada is going to exploit its unilateral leverage for minerals with its major trading partners, the minerals most likely to be utilized are asbestos and potash. However, such action would certainly entail costs as well as benefits. There is no sense in taking action in which costs are likely to exceed

TABLE 21

Summary Assessment of Strengths and Weaknesses for Minerals where Canada has Potential for Leverage with its Major Trading Partners

Mineral	Large % of World Reserves	Large % of World Production	Dominance in Major Consuming Markets	Little or no Recycling	Little or no Substitution	Not likely to be Affected by Special Preference for Imports	Not likely to be Affected by Ocean Mining	Not Affected by Foreign Stockpiles	Exports as a % of Total Canadian Exports (1977)
Columbium	No	No	Yes	Yes	No	Yes	Yes	Partial	<1
Asbestos	Yes	Yes	Yes[a]	Yes	Yes	Yes	Yes	Yes	1.27
Nickel	Partial	Partial	Yes[b]	No	Some	Yes	No	Partial	2.3
Potash	Yes	Partial	Yes[c]	Yes	Yes	Yes	Yes	Yes	1
Zinc	Partial	Partial	Yes[d]	No	No	Maybe	Yes	No	<1
Cobalt	No	No	Partial	Yes	Some	No	No	No	<1
Selenium	Partial	Partial	Partial	No	Yes	Yes	Yes	Yes	<1

[a] Major competition can be expected from the Soviet bloc.
[b] Growing competition from less developed countries.
[c] Major competition from Soviet bloc and Europe.
[d] Growing competition in Europe from Ireland and Spain.

benefits, and it might very well be that matters should be left as they are. However, there are possible options other than unilateral leverage that might be used to strengthen Canada's bargaining position.

It should be recognized that the economist's calculation of costs and benefits concerning the unilateral leverage option does not necessarily coincide with that of the politician. In the next two sections we shall investigate the viability of Canadian participation in mineral cartels and international commodity agreements. In both cases, the political and economic calculus inevitably becomes more complex.

Canadian Policy

In the last section we observed the potential that Canada possesses to pursue resource diplomacy. Such information is valuable but it does not provide us with a well-rounded picture of the directions in which Canadian policy might lead. In this section we shall provide some necessary balance by looking at several additional areas. First, we shall focus on the nature of Canadian policy on the restriction of mineral exports. Following that we shall discuss past and present Canadian policy and actions towards producer associations. Finally, our attention will turn to Canadian policy regarding international commodity agreements for minerals.

Before we begin, however, it is important to note that Canada's military commitments to NATO and NORAD do not compromise Canada's ability to participate in mineral producer associations. A review of the articles of the 1949 North Atlantic Treaty[230] and of the 1958 North American Air Defence agreement[231] reveals the absence of any reference to minerals.

The minerals for which Canada possesses some advantage have numerous military uses (see appendix 1). For example, cadmium is used in aircraft shells. Cesium has an application as a fuel for rockets and missiles. Tungsten is employed in rocket nozzles, aluminum in explosives, lead in ammunition, tantalum in space power systems, columbium in rocket nozzles, copper in cartridge and shell cases, tellurium in solar energy cells, titanium in guided missile assemblies, selenium in lasers, nickel and platinum in jet engines, and so forth.

THE AMERICAN CONNECTION

While Canada's two defence commitments do not specifically dictate the role of mineral resources for defence purposes, there are some past agreements with the United States that have guided Canadian mineral trade at various times. For example, in August 1940, Prime Minister King and President Roosevelt signed the Ogdensburg Agreement which committed both nations to:

...commence immediate studies relating to sea, land and air problems including personnel and material. It will consider in the broad sense the defence of the north half of the Western hemisphere.

These steps were to be implemented by the Permanent Joint Board of Defence. In April 1941, the same two leaders jointly issued the Hyde Park Declaration, which set guidelines for 'mobilizing the resources of the continent' to ensure an efficient cooperative effort under wartime conditions. The agreement covered the provision by Canada to the USA of munitions, strategic materials, aluminum and ships. In May 1945, both countries renewed the Hyde Park agreement for the rest of the war and extended it until the postwar reconstruction and reconversion of industry were completed.[232]

The principles of the Hyde Park Declaration were again extended in October 1950, in an exchange of notes between the American Secretary of State, Dean Acheson, and the Canadian Ambassador to Washington, Hume Wrong. Among other things, the new agreement spelled out that, for mutual defence purposes:

...the two countries shall, as it becomes necessary, institute co-ordinated controls over the distribution of scarce raw materials and supplies.

Further, the agreement sought to eliminate as far as possible any impediments to the flow of strategic raw materials and other defence-related materials.[233]

The Hyannisport Communique of 11 May 1963 between Prime Minister Pearson and President Kennedy stated that they:

reaffirmed the desire of the two governments to co-operate in a rational use of the continent's resources – oil, gas, electricity, strategic metals and minerals – and the use of each other's industrial capacity for defence purposes in the defence-production sharing programmes.[234]

Nevertheless, such production sharing programs, when implemented, did not include contracts for Canadian minerals.[235] U.S. contracts for the strategic minerals stockpile involved separate arrangements.

The following year, 1964, was probably a turning point in Canada's attitude to continental resource trade, although the perspective of the previous 20 years remained strong. In that year the U.S. government ordered a halt on imports of Canadian and other foreign uranium. Paul Martin, the Secretary of State for External Affairs, responded:

It is our view that the natural resources with which this continent is so richly endowed should be regarded as a common asset to be used for our common benefit. We can see little sense in barriers being imposed on the free flow of these resources across our borders. There are indications that this view is coming to be more widely accepted and this is something we welcome.[236]

After 1964, Canadian government discussion increasingly turned to the

restrictions placed on Canadian minerals in the U.S. market, as the following two quotes indicate:

> As far as Canada-U.S. relations are concerned our country is, and should be, for strategic reasons considered part of the mobilization base of our southern neighbour. This should give us an even greater preferential position in the United States than we presently enjoy and this is why Canada continues to work towards exemptions from all import restrictions of the type it now faces or which threaten such basic commodities as oil, uranium, lead, zinc, potash, ferro-alloys, iron ore, steel mill products and others;[237]

> In spite of our continental defence-sharing arrangements, we don't necessarily qualify for an exemption from U.S. restrictions applied on National Security grounds – as witness the recent application of mandatory import controls on Canadian oil. This happened in spite of the fact the Office of Emergency Preparedness, which also establishes oil import policy, has for years considered Canadian suppliers of most minerals as secure as domestic sources in computing strategic stockpile objectives.[238]

It has not been easy for Canada to have these restrictions removed, since nontariff barriers (e.g. quotas and embargoes) are more responsive to the pressures of U.S. domestic politics than to Canadian bargaining power. For example, in October 1958, the Eisenhower administration imposed quotas on imports of lead and zinc concentrates and refined metal. The domestic industry had appealed to the U.S. Tariff Commission for higher tariffs, claiming low prices and unfair competition from imports. The Tariff Commission recommended a tariff increase, but Washington imposed quotas instead, as a sign of deference to Canada and Latin America (the sources of the bulk of the imports). Despite the fact that Ottawa and the Canadian mining companies concerned made representations to the State Department and to the Tariff Commission, the quotas were not abolished until the fall of 1965, when domestic supply fell behind demand due to the increased U.S. engagement in Vietnam.[239]

Many of the appeals made by the U.S. mining industry to have import controls instituted are based on the grounds of national security. In effect, they argue that, if domestic mines are not kept operating, even if this requires government subsidization, the USA will fall victim to the vagaries or fancies of foreign governments. More recently, the Carter administration was less willing to heed these appeals regarding zinc and copper, partly because of the desire to control inflation and, in the case of copper, to help the CIPEC members from falling further into debt.[240]

Obviously, Canada finds itself confronted with a problem. On the one hand, it is aligned militarily with the USA and thereby commits its minerals to U.S. needs in wartime. On the other hand, when the USA is not engaged in a war there is much less need for Canadian minerals, and Canadian minerals are subject to the ups and downs of the market as well as to domestic political pressures in the United States. As a result, Canadian producers have

been encouraged to develop new markets and become less dependent on the USA.[241]

To conclude, there are no restraints imposed by Canada's military commitments to prevent it from entering a producer association. While the USA and Canada have entered into agreements in the past concerning the use of Canadian minerals for mutual defence purposes, such agreements lapsed as the postwar reconstruction gave way to a more normal peacetime economy. The Hyannisport Communique was more a summary of spirit than of intent and, as Canada encountered various limitations to access to the U.S. market after World War II, it became more concerned with its own sovereign purposes. This was particularly true following the accession to power in 1968 of the Trudeau government, which has taken a more interventionist approach than previous governments in matters related to the production and trade of mineral resources.

EXPORT RESTRICTIONS AND EMBARGOES

In Canada, only the federal government has the constitutional authority to control the export of minerals. In 1947 the Export and Import Permits Act was passed by the House of Commons. The intended purposes of the act were:

- to ensure that adequate supplies of commodities were available for use in Canada when needed;
- to give the government control over exports of strategic materials, in line with Canada's future commitments to cocom (the Co-ordinating Committee);
- to allow for greater supervision of re-exports of U.S. goods from Canada.

In 1974 this legislation was amended and wider scope was given to Ottawa to intervene in export traffic. Thus, the federal government may now restrict exports of raw or processed materials to promote further processing of raw materials in Canada.[242] In addition, Ottawa may restrict exports of raw or processed materials in the event that prices are depressed and there is a surplus of supplies.

This is extremely important legislation. It permits the government to control exports in a manner that may on occasion be characteristic of controls used in producer associations and international commodity agreements. There should be no misunderstanding about the nature of this federal authority. It implies a constraint on private corporate decision making, although it is generally exercised only under restricted circumstances which may or may not come to pass.

Export controls generally take two forms: restrictions and embargoes. The length of time that controls can be imposed in each case will vary depending upon the circumstances. The reasons for imposing controls can also vary. In the 1960s restrictions were placed on the export of copper because

of shortages. Beginning in January 1970, the Saskatchewan government applied production controls to potash because of depressed conditions in the industry. In effect, controls on production meant restrictions on exports. It is said by some that the constitutional problem that this case highlighted (given the apparent provincial interference in federal jurisdiction) was the reason the revised 1974 Export and Import Permits Act included mention of export controls in the event of depressed prices and surplus supplies.[243]

In the past Canada has placed embargoes on the shipment of minerals to two groups of countries:

i countries which will not sign a nuclear safeguard agreement with the Government of Canada – only uranium is of concern here;
ii communist countries, which are denied access to Canadian minerals which can be utilized for military purposes.

Canada began to contemplate an embargo on uranium exports in 1974 after India exploded a nuclear bomb, developed in part with the help of Canadian technology and uranium. The Canadian goal was to avoid a recurrence of the Indian development by placing controls on the military use of uranium through export restrictions (including re-export) on Canadian uranium and nuclear technology. After several postponements, the embargo was finally enacted in January 1977. Shipments of uranium to the EEC, Japan, Switzerland and a number of LDCs were halted.[244] The USA was exempted from the embargo because both countries were working together on similar standards. By 31 December 1977, Finland and Spain had agreed to the required safeguards, while Canada and the USA concluded an agreement the month before. The EEC concurred in January 1978, Japan in August 1978, but no agreement has as yet (1983) been reached with Switzerland. In the case of agreements with the EEC and the Japanese, the controls were less stringent than Canada had originally intended.

The embargo of certain mineral shipments to communist countries involves a coordinated rather than a unilateral effort on Canada's part. This coordination arises through COCOM, which was set up in 1949 as a result of the perceived military threat of the Soviet bloc countries. A U.S. inspiration,[245] COCOM includes Japan, France and all the NATO countries except Iceland and Spain. U.S. participation in COCOM is based on two pieces of legislation;

i the Export Control Act of 1949, succeeded in 1969 by the Export Administration Act;
ii the 1951 Battle Act which authorizes an embargo on military items and commodities of strategic value to any nation or combination of nations threatening the security of the United States.

One reason why COCOM worked so effectively in the first ten or so years of its existence was that the White House had the authority to revoke Marshall Plan aid to any country not complying with the embargo.[245] Indirectly, there was thus an incentive (by no means the major one) for Canada to support the aims of COCOM, since it was receiving Marshall Plan funds through the purchase of Canadian goods by European countries:

> For both Lend-Lease and Marshall Plan procurement, Canada was treated as a source eligible for the expenditures of U.S. government funds. Until tied aid procurement was introduced in 1959, the U.S. bilateral foreign aid program procured substantial quantities of Canadian commodities – primarily, though not exclusively, raw materials.[247]

In the aftermath of the Korean War, with the growing economic recovery of the other COCOM members, the value of the U.S. threat to terminate aid soon dissipated.[248] Then, COCOM became a truly voluntary organization, described as a body which:

> coordinates the policies of independent governments. Actions in COCOM are, in effect, recommendations to member governments and actions by COCOM become effective only as they are carried out by member governments through the individual export control programs under their own national laws.[249]

While there are criteria for making exceptions from the COCOM embargo list, there is at present a certain lack of coordination in COCOM decision making.[250] The criteria for exceptions are as follows:

> i the item is available outside COCOM in the communist bloc or elsewhere;
> ii the item is obsolete;
> iii the item has no known strategic military application.[251]

At present, minerals *per se* are not the most important considerations in COCOM decisions; more important are items with more immediate military applications, such as computers and certain oil exploration equipment.[252]

Information regarding specific decisions by the Canadian government whereby a mineral is placed on the embargo list for communist countries is classified. However, one case has come to light. In the fall of 1976 the federal Cabinet placed an embargo on the shipment of cesium to all communist countries. This mineral has potential usage as an energy source for space vehicles:

> it will not lift a space unit from the earth or even push it back. But it will move the unit about in space and, at the same time, eliminate the need to store quantities of heavy rocket fuel while in orbit.[253]

Prior to the embargo, the USSR had been a major purchaser of cesium from the Tantalum Mining Corporation (Tanco) at Bernic Lake, Manitoba, Canada's only cesium mine. Apparently it was believed that, instead of using

the cesium for advanced electric power generation on land, the USSR was stockpiling it for present or future space use. Needless to say, the Government of Manitoba (with 25 percent equity in the firm) and Tanco were upset about the embargo. However, neither has recourse to change the decision.[254] The mine was closed in 1982 for economic reasons.

To summarize, we have discovered that Canada may on occasion place restrictions or an embargo on various mineral exports. The reasons for the restrictions have tended to be economic in origin, while the rationale for embargoes has been based on political and military concerns. The case of the uranium embargo is somewhat of an anomaly because some of the targets of the legislation were NATO countries. This is likely an isolated case, but it may also be a harbinger of a new outlook by Canada in regard to the disposition of its resources.

CANADIAN POLICY ON PRODUCER ASSOCIATIONS

To a large extent, Canadian mineral trade is left to private sector mining companies, both foreign and domestic. Under wartime conditions the federal government has stepped in and reoriented the nature of Canada's trade (for example, with the creation of the Wartime Metals Corporation). However, there are other reasons why Ottawa intervenes, some of which we have already discussed. Now we want to investigate its approach to the regulation of mineral trade by producer associations and international commodity agreements.

The position of the federal government is based on a simple principle that has been consistently applied in the postwar era: 'each case (commodity) deserves attention on its own merits'.[255] The flexibility inherent in this approach has led to a number of different actions.

First, Canada participates in study groups composed of producing and consuming countries (see appendix IV) under the auspices of the United Nations, such as the International Lead-Zinc Study Group, which Canada joined when the study group was formed in 1958, and the Committee on Tungsten, which Canada joined in 1963. The primary purpose of such groups is to share information, particularly in periods of excess supply and low prices. For both commodities, Canada is both a producer and a consumer.

In addition, in 1956 Canada joined the first International Tin Agreement as a small producer and a large consumer. Since then, six subsequent agreements have been signed, the last in 1982. The agreements set production quotas and delineate consumer purchase commitments. As well, they attempt to steady the fluctuation of the tin price by setting upper and lower price limits. The agreements have had a certain degree of success, although they are more effective in maintaining the floor price than the ceiling. However, part of the success must be attributed to the disposal policy of the U.S. General Services Administration which controls the U.S. tin stockpile.[256]

Producer-consumer groups of the kinds noted above are Canada's first preference. However, according to a senior official in the Department of Energy, Mines and Resources: 'where consumers exhibit no interest in recognizing difficulties in the marketplace there may be a need for producer associations'.[257] To date, it appears that Canada has been invited to join two nonfuel mineral producer associations: CIPEC (copper) and APEF (iron ore). Canada turned down both requests. In the case of CIPEC Canada has chosen to maintain observer status as a means of collecting information. In neither case is Ottawa involved in discussions of price setting.[258]

One precedent has been set for Canada's participation in a mineral producer group,[259] although in this case, uranium, the producers were also large consumers. The producer group, initially called the Uranium Marketing Research Organization (UMRO), excluded nonproducers in the noncommunist world as well as some small producers. In addition, U.S. producers were excluded because of their desire to avoid running afoul of American antitrust legislation. Table 22 provides a list of the corporations in the uranium group that were active in Canada. Other countries involved were South Africa (Nuclear Fuels Corp.), France (Uranex), Australia (Rio Tinto Zinc) and West Germany (Urangesellschaft).

TABLE 22

Uranium Marketing Research Organization: Participants in Canada

Corporation	Country of Ownership
Noranda Mines Ltd.	Canada
Eldorado Nuclear	Canada
Denison Mines	Canada
Gulf Minerals	United States
Uranerz Canada Ltd.	West Germany
Rio Algom	Britain

At the instigation of Ottawa, the group began discussions in the fall of 1971.[260] The impetus for the move involved several factors. In 1964, the USA (accounting for about 70 percent of world consumption) barred foreign uranium. Consequently, world prices dropped. Producers outside the USA were caught with a large excess of supplies, and were forced into production cutbacks that had severe effects on local communities (e.g. Elliot Lake and Uranium City, in Canada). In 1967, to complicate matters further, an American company, Westinghouse, began dumping uranium on the world market in an attempt to gain a large share at the expense of foreign producers, as well as to put pressure on a domestic rival, Gulf Minerals. In the 1950s the price per pound of uranium ranged from $9-$12. By 1971 the price had

dropped to the $4-$5 range: these were, in effect, 'distress prices'. However, by July 1978 the price had climbed to $44 per pound, a remarkable turnaround.

Exactly how much the uranium cartel contributed to this price escalation is difficult to tell. Most studies indicate that cartel action played little or no role in determining prices.[261] More significant factors can be identified, particularly the pricing policies of Westinghouse (prices had been abnormally depressed), and the 1973 OPEC price increase which led to a strong demand for alternate fuel sources. It is possible, however, that if the uranium cartel had not existed the price of uranium would not have risen as high as it had by October 1974. At that time, the cartel ended its price controlling activities, as the world price went above the group's minimum price. By June 1975 the cartel had changed its name to the Uranium Institute, invited consumers to join, and moved its headquarters from Paris to London, England. Contrary to statements by some Canadian and American politicians, the existence of the uranium cartel was not a secret, although its discussions about production and pricing were kept confidential.

There have been a number of consequences arising from the creation and action of the uranium group. First, the Progressive Conservative party, then in opposition, indicated its distaste for any participation in producer associations. Second, the U.S. Congress raised the maximum fine for American corporate involvement in producer groups to $1 million and made such participation a felony.[262] Third, it resulted in the largest, perhaps most complex court case in U.S. legal history, involving Westinghouse, Gulf, Rio Algom and numerous utility companies.[263] Fourth, the Canadian government set a precedent for future action. According to Alistair Gillespie, then the Minister of Energy, Mines and Resources, Ottawa had had to take action in order to '...provide a stability of price for uranium and... (ensure) the survival of certain communities in Canada.'[264] But the government was a long time in acting. Canada had faced market exclusion, low prices and community disruption for about 8 years prior to Ottawa's intervention. This may fit the criteria Ottawa has established for participation in a producer association, i.e. it must be an 'exceptional situation'[265], but 8 years is a long time and patience may be shorter next time, particularly if the case involves a mineral in a province which is greatly dependent on mineral production for employment and tax revenue.

There was one unfortunate and somewhat comic consequence of Canada's participation in the uranium cartel. On July 1981, the Department of Consumer and Corporate Affairs laid charges against the six Canadian companies that belonged to UMIRO but did not charge the government officials that directed the companies to join. The companies were accused of price fixing in the domestic market between September 1970 and April 1978. There is no evidence that the uranium price was affected in Canada.

It is worth noting that the companies were not charged with fixing the price and volume of exports. Under Canada's Combines Investigation Act such a charge might have been forthcoming. However, such action was preempted when the Trudeau Cabinet passed an order-in-council on 19 July 1972 which extended the powers of the Atomic Energy Control Board to regulate the price and volume of uranium exports.[266]

If the Canadian government wishes to facilitate future participation in cartel arrangements, the following amendments should be made to the Combines Investigation Act.

i The act should be deemed to be subservient to the 1974 Export-Import Permits Act which allows for price and volume regulation of exports; or, the act should be directly amended to reflect this exemption from prosecution.

ii When Canadian companies participate in a cartel they should be permitted to operate with a two-tier pricing system (somewhat similar to the oil pricing system now in Canada); the domestic price would be set lower than the export price, with allowance for both to operate within specific limits.

In making these recommendations, the author is not proposing cartel action, but rather stressing the need for policy makers to keep their options open. Almost all cartels are doomed to failure, and as a general rule, Canada should avoid them. Nevertheless, if the need arises, the way should be clear for Canada to operate within the law.

CANADA AND POTENTIAL CARTEL ACTIVITY

In the last chapter, we identified the strengths and weaknesses that Canada possesses for certain minerals. Earlier in this chapter, we surveyed the requisites for a successful cartel. The purpose of this section is to blend an analysis of Canada's mineral strengths with several cartel possibilities.

World columbium exports are overwhelmingly dominated by Brazil. In effect, a cartel for columbium is superfluous since Brazil is the unchallenged price leader. Nonetheless, as we saw in the last chapter, columbium is characterized by certain weaknesses which constrain Brazil's options. The same can be said for cobalt. Zaire alone supplies 51 percent of world production, but stockpiling (chiefly in the USA), substitution (particularly nickel) and the prospect of ocean mining all present technical problems that undermine Zaire's potential unilateral leverage. Cartels for either columbium or cobalt would face problems (such as we shall discuss below for several minerals) which make their potential usefulness a matter of considerable doubt.

Several years ago a study by the International Economic Studies Institute in Washington D.C. reported that, in the case of zinc:

cartel-like action may be unlikely because of the importance of the U.S. market to foreign producers, the wide number of zinc sources, the potential U.S. productive capacity, and the eventual availability of certain substitutes.[267]

The conclusions in the previous chapter confirm this analysis. Selenium also faces serious substitution problems, and is produced in significant quantity in Japan and the USA. Thus, there appears to be little likelihood of a selenium cartel. We shall therefore concentrate our analysis on three minerals which have a more prominent international profile (nickel, asbestos and potash) and one mineral which has attracted considerable attention because of an existing producer association and discussions for an international commodity agreement (copper).

A Nickel Cartel?

In 1981, Canada produced about 22.3 percent of the world's nickel, slightly more than its nearest rival, the USSR (20.6 percent). Despite the fact that Canada has maintained its lead in world production, its competitive position has been weakened in recent decades by the appearance of many new producers. In 1950, Canada produced 95 percent of the world's nickel. By 1970 it produced 60 percent of the total and by 1978 Canada was producing only about 31 percent of the world total.[268] Canada's older rivals, New Caledonia and Cuba, have been joined by the USSR, Indonesia, Australia, the Dominican Republic, Guatemala, and Botswana, among more than 20 new producers in all.

Canada's rank in world reserves is no more reassuring. New Caledonia has 25 percent of world land-based reserves, while Canada is second with 16 percent (see appendix II). Canada's reserves are sufficient to meet domestic and foreign demand until after the year 2000. New Caledonian reserves and those of most of Canada's new competitors are lateritic ores, while those in Canada are sulphide ores. One estimate suggested that by the year 2000 over 50 percent of world nickel supplies would come from lateritic ore,[269] although this was before rising energy costs made lateritic ores less competitive. It is believed that about 75 percent of land-based nickel reserves are lateritic.[270] Overall, there will be increasing pressure on the competitive ability of Canadian nickel producers, particularly from the USSR.

Until the mid-1970s, Canadian nickel companies (usually Inco, but sometimes Falconbridge) normally had the market strength to set the world price for nickel. Société Metallurgique le Nickel de France, however, had by the end of the 1970s been leading price increases because its costs were pushed up significantly by increases in the price of oil, on which it is greatly dependent for processing its lateritic ores. Costs rose less rapidly for Canadian producers, whose energy requirements are lower and who have access to hydroelectric power. Nonetheless, Inco and Falconbridge followed the price

increases. However, increased nickel production by the USSR in the 1980s, coupled with the increases in Cuban production and price-cutting by the Eastern bloc and Third World producers, left both Inco and Falconbridge in 1982 struggling desperately to defend the producer pricing system. By June 1982 the Canadian producers gave up their fight and started discounting prices. As a result of the price war, Canadian producers lost a portion of their international market share, particularly in Western Europe, largely to the Soviet Union.[271]

This poses the question of whether or not Canada could cooperate with the Soviet Union and Cuba in a nickel cartel. To avoid too much repetition, possible participation by the Soviet Union will be discussed in detail in the next section on asbestos.

Attempting to coordinate production and pricing policy with Cuba would likely be a persistent and constant source of friction. Cuban sales of nickel to the developed market economies are governed by the country's own internal needs:

> ...primarily by considerations of debt servicing to western creditors and by foreign exchange requirements to pay for imports, particularly in years of bad (sugar) harvests.[272]

Moreover, Cuba has signalled its intentions[273] to increase its nickel production by 400 percent by 1990. The dumping strategy of the Cubans will likely be paralleled by the Soviet Union, which increased total nickel exports by 15 percent in the first half of 1982, despite falling prices.[274] Of course, one could assume logically that this dumping will be cyclical, depending upon the foreign exchange needs of the Soviets and Cubans. However, because of the Soviet Union's significant debts to the West, its obligations to subsidize the Polish, Cuban and Vietnamese economies, its heavy financial commitment in Afghanistan and its need for grain imports, one could assume, even being cautious, that the Soviet Union will continue to need hard currency at a constantly escalating rate. Since the export of minerals (particularly oil, natural gas, gold, platinum, nickel and asbestos) and the expansion of its share in western markets bring in needed foreign exchange, the Soviet Union will likely continue to undercut western mineral producer prices, albeit at varying rates.

This scenario would seem to bode ill for Canadian producers. However, there are some optimistic notes. Part of the optimism derives from a comparison of costs between sulphide and lateritic producers. An Ontario government study[275] concluded that, while the lateritic ores are of lower quality than Canadian nickel ores, some of the newer lateritic deposits have higher production rates, and therefore their labour costs and the unit cost of ore production are lower. On the other hand, higher energy costs have improved the competitive position of Ontario nickel sulphide ores, since

relatively less energy is used in refining them than is necessary for the lateritic ores found in many of the new projects.

Another advantage for Canadian producers is that, along with the nickel, by-product minerals of great value are also recovered (e.g. cobalt, gold, silver, platinum). Except for cobalt, the same is not true for the lateritic producers. In 1977, Inco's operations in Ontario had a cost advantage of 50 to 66 percent per tonne over new lateritic projects. Falconbridge's costs were equal to or as much as 50 percent less than those of new planned projects.[276] A major reason for this cost advantage is that both Falconbridge and Inco depend heavily upon hydro-electric power,[277] while most of the LDC nickel mines and processing plants are reliant on oil (except for the Inco operation in Indonesia which also uses hydro-electric power).

A new processing technology has been developed that could undermine the Canadian advantage in nickel cost in the long run. An American company, Amax, has developed a new energy-conserving extraction process (Amax Acid Leach Process) for any lateritic nickel orebody; the key to the process is the use of sulphur as a source of primary energy.[278] The energy cost reduction will be in the order of 40 percent.

There are other limits to the degree that producing countries can raise the price of nickel. One major restraining factor is the possibility of ferromanganese nodule mining. While the expected cost of retrieving the nodules is higher than that for land-based nickel mining, developed countries which felt threatened by production restrictions and/or higher prices imposed by a nickel cartel could turn to subsidizing the ocean mining activity of their domestic corporations.

Substitution and recycling could also undermine the viability of a nickel cartel. Prolonged strikes in the Canadian nickel industry during the 1960s and the heavy demand for nickel during the Vietnam War not only encouraged the development of new sources of supply, as we have noted, but also stimulated attempts to develop nickel substitutes:

> alternative materials (titanium, plastics, aluminum, chromium, molybdenum, cobalt, vanadium and manganese) exist in most uses, but generally speaking, sacrifices are made in terms of technical specifications and cost.[279]

Although substitution has so far been less than successful, it is still an objective pursued vigorously by many companies.[280] While it is theoretically possible to recycle 60 percent of all nickel produced,[281] actual recycling rates are much lower. As was noted in chapter 2, the recycling rate for nickel in the United States is only 23 percent. For the present, we can conclude that substitution and recycling do not play a dominant role in restraining nickel prices.

As of 1981, Canada, the USSR, Australia, New Caledonia, Indonesia and Cuba accounted for 76.1 percent of world nickel production (see appendix

m). Canada, Australia, the USSR and New Caledonia (France) have financial strength sufficient to stockpile nickel, in the event of production cutbacks to obtain higher prices. Cuba does not. Furthermore, the USSR has a much stronger incentive to export than to stockpile, as does New Caledonia which is heavily dependent on nickel mining (along with tourism) and it would suffer much more in the event of a production cut-back than either Canada or Australia.

While Inco alone accounts for 60 percent of the value of Ontario's mineral production[282] through the production of nickel and nickel by-products such as copper, gold and platinum, mineral production represents only 3.4 percent of the gross provincial product of Ontario.[283] Thus, the Ontario economy is not likely to be seriously jeopardized in the event of a production slowdown or a production shutdown, although the impact on northern Ontario is another matter. During the 1978-79 strike against Inco, the longest strike in Canadian labour history, $80 million in spending power was lost to the Sudbury economy, while the average striker lost about $11,000.[284] However, new employers are moving to the Sudbury region and could buffer the community in the long run. The political backlash in 1979 was not as heavy as expected: for example, a sitting Liberal member from the Sudbury riding, James Jerome, was re-elected to the House of Commons despite strong labour opposition. It is doubtful that a less developed country could sustain such a production shutdown without encountering more far-reaching consequences.

At the moment, Australia belongs to four producer associations, either as a full member or as an associate member: bauxite (IBA); copper (CIPEC), iron ore (AIEC); and tungsten (PTA). Nevertheless, Canberra has shown itself to be of independent mind when approached by other producers to cooperate in regulating production and prices. This maverick attitude has continued through two changes in power in Canberra.

In the past Canada, Australia and France have cooperated on production and pricing for uranium. Therefore, future cooperation on nickel should not be impossible. While it is possible for these nations to coordinate policy, their cooperation with LDC laterite nickel producers is less likely; and since Australia also has some laterite nickel production, doubt might be cast on forming an alliance in that direction if past pressures continue. An Ontario government study points out that:

> the new nickel projects in Guatemala, Indonesia, Philippines, Botswana, Queensland and elsewhere must sell nickel at any price, if only because of the rigid loan repayment schedules of these ventures, which cost hundreds of millions of dollars.[285]

It is also true, for the LDCs at least, that lower nickel prices force them, sometimes unsuccessfully, to order or encourage domestic nickel mining companies to increase output so as to maintain foreign exchange earnings.[286]

This behaviour by LDC nickel producers is similar to that observed in Third World copper exporting countries. One could argue that this situation, where the LDC nickel producers undercut the market price set by the dominant producers in order to maintain foreign exchange earnings, would provide all producers with the motivation to call for a price-raising cartel. This has not happened. In the event that nickel exporting countries in the developed and less developed world were to agree to form a cartel, it seems probable that, if production and export controls were required during a period of declining demand in order to maintain prices, the LDC producers would be hard pressed to keep their commitment of exporting less. In this light one could conclude that the nickel producers in the developed world would have to make the sacrifice of reducing exports even more in order to sustain the viability of the cartel.[287] This sacrifice would result in a loss of efficiency, in Canada in particular, because the Canadian nickel mining companies are the lowest-cost producers in the world.

It may be thought that, since only a few private companies control the bulk of nickel production and refining in the noncommunist world, it would be relatively easy for the governments of exporting countries to pressure the companies to join a formal cartel, as was the case with uranium. Such a conclusion would be an oversimplification. In a recent study of corporate (private and public) ownership for six sectors of the western world's mining industry, Radetzki found that the six leading companies controlled 67 percent of uranium production, 65 percent of aluminum refining, 49 percent of copper mining, 52 percent of iron ore production, 83 percent of nickel refining and 83 percent of tin smelting. However, he noted that:

> though concentration appears to be considerably higher in the nickel and tin industries as compared to uranium, collusion in the former (i.e. nickel and tin) may be harder to achieve because of the great differences of the size of the leading suppliers, and the consequent difficulty in creating a common ground for solidarity.[288]

One might add that there are also significant cost differences, which we have touched upon previously.

Another factor which could be disruptive to the operation of a nickel cartel involves U.S. antitrust legislation. Although noncommunist world production of nickel is dominated by French, British, Canadian and South African as well as American companies, the U.S. firms also have widespread investments. If we add to this list firms outside the USA in which there is significant American ownership, the spread of U.S. investments in world nickel mining is greater still. For example, U.S. interests have equity in the following foreign companies:

- Australia - Freeport Minerals;
- Philippines - Sherritt Gordon;
- Indonesia - Inco;

- Botswana - Amax;
- South Africa - Falconbridge and Superior Oil;
- Dominican Republic - Falconbridge and Armco Steel;
- Guatemala - Inco and Hanna Mining;
- New Caledonia - Amax and potentially Inco;
- Canada - Inco, Falconbridge and Sherritt Gordon;
- Norway - Falconbridge;
- Britain - Inco (refineries).

Inco is approximately 54-percent Canadian owned. Superior Oil of Houston controls Falconbridge through McIntyre Mines in Canada. Sherritt Gordon is controlled by Newmont Mines of the USA.

Given the extent of American corporate interests abroad in nickel mining and refining, and the proclivity of the USA to intrude in the affairs of other nations by invoking antitrust legislation against American corporations and their affiliates when prices and supplies are affected in the U.S. market, it seems probable that the U.S. government could thwart the effectiveness of a nickel cartel's operations by provoking one of the largest antitrust suits in American history. Another potential problem for a nickel cartel is the growth of nickel production in the 1980s in one country, Brazil, which has consistently opposed participation in producer associations, and in another, Colombia, which is a newcomer to nickel mining.

If a nickel cartel managed to overcome the problems cited above, it would have until approximately 1990 to operate relatively unchallenged by nickel production from ocean nodules, according to present estimates. However, the major importing countries - USA, Japan and the EEC - would likely begin to step up subsidization of ocean mining significantly long before then. Of course, under these circumstances it is quite likely that a Law of the Sea Treaty would be in shambles. One other potential problem for a nickel cartel concerns a possible conflict of interest for at least two companies: Inco, and Société Le Nickel of France. Both are involved in consortia trying to perfect ways to mine ocean nodules. Thus, if a nickel cartel were trying to restrain production to raise prices, both companies might be concerned that their multi-million dollar investments in ocean mining technology were being used inefficiently unless full production was being realized.

In general, we can conclude that the possibility of a successful cartel operation for nickel, though not remote, is at best weak. It is likely that future discussion of the western world's nickel industry will revolve around an international study group rather than the formation of an international commodity association, a producer association, or a cartel. In fact, Canada, the USA, Indonesia, Australia, the Philippines and Brazil are presently examining the possibility of a study group.[289]

From 1950 to 1970, Canada's share of world asbestos production declined from 65 percent to 43 percent. By 1981 Canada's share was further reduced to 22.7 percent.[290] Canada possesses about 35 percent of world asbestos reserves. The Soviet Union alone accounts for 42 percent of world supplies, and, together with its Eastern bloc allies, about 27 percent of world reserves. The only other country with significant world production (6 percent) and reserves (21 percent) is South Africa. It is quite evident, therefore, that asbestos is heavily concentrated in terms of geographic location.

There are several varieties of asbestos. The chrysotile variety accounts for 94 percent of world production.[291] Canada's share of total world exports for all varieties is 59 percent; if only chrysotile is taken into account, Canada's share jumps to 65 percent.[292] Companies operating in Canada set the world price for chrysotile asbestos.

As could be expected, the USSR has provided Canada with some stiff competition. The USSR's exports outside the Eastern bloc grew substantially in the 1970s, and have somewhat eroded Canada's traditional markets.[293] From 1974 to 1977 Soviet exports rose from 525,000 tons to about 800,000 tons. To maintain and expand its markets, the USSR has relied heavily on barter arrangements, price discounting and long-term contracts with buyers in the United States, Japan and France. The effect of this competition on the Canadian producers has largely been felt in the Japanese and Western European markets. For example, in 1977 alone, Soviet exports to Japan displaced about 100,000 tons of Quebec asbestos, and has raised the Soviet's share of the Japanese market to 50 percent or more.[294]

It seems unlikely that the USSR would, at present, commit itself to open, formal participation in a cartel. The Soviet Union is traditionally secretive about production, consumption, and stockpile data. Formal participation in a cartel would require the termination of such secrecy. But this does not mean that the Soviets will not support cartel action. The USSR played a role in encouraging OPEC to raise oil prices in 1973,[295] and has ridden along with the OPEC price, generally staying just enough under to make Soviet oil exports more attractive to Western Europe. The exceptions in the past have been when the Soviet Union sold oil on the spot market, where prices have sometimes been one and a half to two times the average world market price. Further, there are times when observers have the impression that there is tacit cooperation between the Soviets and South African companies in the production and pricing of platinum.[296] The same appears to have been true of Soviet and South African production and pricing of diamonds.[297] For an example of open, formal participation by the USSR in a cartel with western producers (France, Germany, Spain, Palestine, and the USA as well as Poland) one has to look back to the late 1930s. In 1938 the USSR joined the

international potash cartel as the new price leader.[298] The relationship appears to have ended with the beginning of World War II.

While the USSR tends to undercut the price of oil and aluminum,[299] it does not shrink from taking advantage of tight supplies. From 1967 to 1971, when Rhodesian chrome was subject to U.N. sanctions, the Soviets raised the price of chrome exports by 188 percent.[300] Given the Soviet Union's need for foreign exchange to pay for western technology, to repay western loans, and to finance grain imports, it is understandable that the USSR would support high prices for mineral exports set by a cartel or which arose due to a shortage of supplies. The major question seems to be whether or not the factors which give rise to fluctuations in Soviet exports could be sufficiently controlled to permit cartel participation or tacit cooperation. The answer is apparently yes, to some extent, in the cases of platinum, diamonds, and mercury (as we saw earlier). It is reasonable to argue that, while the Soviets (at least for the short-term future) would ride a higher asbestos price initiated by Canada during market upturns, they could probably undercut the Canadian price during both up and down market phases in order to take away the foreign markets of Canadian producers. However, this is not the way the USSR has acted in the current mercury cartel.

As for South Africa, Canada's cooperation with Pretoria is not necessary because of the difference in asbestos ores predominant in each country's production. Moreover, Canadian producers are world price leaders and do not currently need cartel support.

However, asbestos is encountering several problems which warrant caution by Canadian policy makers. In the last decade or so, serious concerns have arisen about the health and environmental implications of asbestos production and use. This concern has surfaced mainly in the OECD countries, and has led to calls by some to ban asbestos products and by others to search for substitutes. Canadian asbestos is considered less dangerous to human health and to the environment than the Soviet or South African varieties.[301] Thus, if a concerted attack on asbestos production and consumption developed, Canada would fare somewhat better than its major competitors. Nevertheless, Canadian officials have expressed concern to the EEC about its members' desire to limit asbestos use. In the fall of 1978, Quebec, British Columbia, Newfoundland and the federal government sent representatives to Brussels to meet with European officials to discuss the problem.[302] One result of their meeting was a joint Quebec-EEC asbestos research project.[303]

In the meantime, tens of thousands of litigation claims against the asbestos industry have arisen in the USA, and the world's largest producer, Johns-Manville, has filed for reorganization under U.S. bankruptcy laws to stave off hundreds of millions of dollars in potential liability arising from the litigation.[304] The negative publicity that asbestos has received will act as a major incentive for consumers, particularly in the developed market

economies, to find substitutes.

It is expected that environmental and health considerations in the USA and Western Europe will, among other factors, help to hold asbestos production growth near current levels for the remainder of the decade. The only bright prospect for demand lies in the developing world, where growth up to 1990 may average as much as 3.5 percent per annum.[305]

To date asbestos has not been threatened greatly by substitution in its major uses:

> generally, glass fibre does not have the same strength in cement reinforcement and is characterized by too low a melting point for friction products and damaging wear characteristics. The lack of the combination of strength, fire-resistance and flexibility properties does not allow fibre glass to substitute for textiles made from asbestos.[306]

Polyvinyl chloride, a petroleum derivative, may not continue to be a successful alternative to asbestos and cement for making pipes, because the cost of petroleum has risen so rapidly. There is successful substitution for asbestos in insulation by other mineral products such as kaolin wool, but insulation is not a major end-product use of asbestos.[307] Asbestos end-products generally cannot be recycled, because of inadequate technology and because the cost is much too high. As we noted previously, there does not appear to be any danger of price decreases for asbestos due to stockpile disposals in the major consuming countries because, except in the United States, asbestos is generally not stockpiled.

While Canada is capable of sustaining high unemployment due to cutbacks in production of asbestos for the purpose of raising prices, it should be noted that 85 to 90 percent of Canada's asbestos production occurs in Quebec. It would be harder for Quebec to sustain a shutdown of asbestos production than it would be for Ontario in the case of nickel. But, given various government assistance programs, the resulting unemployment should not be considered as serious a problem as, for example, the financial burden faced by a Third World country in a similar situation.

A formal cartel in the case of asbestos does not seem likely in the immediate future. Any unilateral action by the Canadian government to increase the price of asbestos could be supported by the Soviet Union and South Africa. However, there is probably a point at which the USSR would begin to undercut the Canadian price. In general, should the Canadian government decide to utilize the bargaining strength which lies in the possession and trade of asbestos, unilateral action would probably be the most feasible and most easily implemented route. An export tax would likely be the simplest form of intervention. Such action, of course, would hasten the process of substitution, and undermine the viability of the price hike.

A Potash Cartel?

The word cartel is not unfamiliar to the producers of potash in this century. Until the development of new sources of supply in the early 1930s in the United States and the Soviet Union, world potash production and pricing was controlled by a cartel centered in Germany.[308] By the late 1930s, both new producers had joined the cartel, with the USSR becoming the new price leader. Though this cartel broke up during the war, restraints on competition continued:

> in postwar North America, natural and institutional barriers inhibited entry and a few sellers faced several hundred buyers, a situation that provided little incentive to sell at prices below a joint profit maximizing level. A subsequent easing of institutional barriers and the attending rise in the number of sellers, accompanied by a decrease in the number of buyers, progressively constrained collusion and resulted in secret price cutting; however, political forces intervened and a competitive outcome was never realized.[309]

The political intervention that Koepke describes was the imposition of prorationing by the government of Saskatchewan in November 1969. The prorationing regulations were introduced to counter falling prices (47 percent decline from 1965 to 1969), falling demand, falling exports to the U.S. market, increased production capacity due to the start-up of new Saskatchewan mines, growing unemployment, corporate financial difficulties, and declining government tax revenues.[310] This action, which included a floor price and production quotas, had numerous consequences. Within a year, the price of potash (per short ton K_2O) rose 63 percent. Moreover,

> the program also benefited all world potash producers, because the minimum price established in Saskatchewan became the basis for world potash pricing. The New Mexico potash industry became healthy again, thus averting U.S. producers' action on dumping charges against Canadian potash.[311]

However, there were legal complications which cast some doubt on the possibility of success of similar actions in the future. After a lengthy court case, the Supreme Court of Canada ruled in 1978 that Saskatchewan's prorationing regulations were unconstitutional because they encroached on the federal government's power to control international trade. In practical terms, this decision means that if Canada were to create similar regulations again in the future, either on a unilateral basis or within the context of a cartel, such regulations would have to be implemented by the federal government.

The strengths of potash in international markets are exceptional, compared to those of most other minerals. There is no substitute for potash in its major use (95 percent) as an agricultural fertilizer. Potash cannot be recycled; neither is it stockpiled by any of Canada's trading partners, although the USA is a major producer. Canada is the world's leading exporter,[312] with

47 percent of the total in 1978; this is expected to rise to 51 percent by 1984. In 1978, East Germany accounted for 22 percent, and the Soviet Union 20 percent. The shares of the latter two are expected to be, respectively, 15 percent and 22 percent in 1984. Clearly, Canada will continue to dominate potash exports in the future, and will continue to be the price leader.

Since, together, Canada, East Germany, and the Soviet Union control about 89 percent of world potash exports, these countries would be the logical constituents of any potash cartel that would be effective over the long run. It is possible that both East bloc countries could be convinced to support Canpotex prices, but the strong reservations about Soviet production and pricing raised earlier could apply here as well. (Canpotex is the marketing arm of Canadian potash companies for all sales outside of North America.) The price of potash in 1981 was $142/ton; by mid-1982, the price had fallen to about $100. While Canadian and other western producers reduced potash production to bring supply into line with demand, both East Germany and the Soviet Union continued to maintain existing production levels, while cutting prices, in order to earn needed foreign exchange.

Overall, world potash production is expected to grow by about 3 percent per year over the remaining decade. This should allow Canadian companies room to exert price leadership as Canadian supplies come quickly on to the world market. The contrasting flat growth outlook for asbestos would indicate that stronger price competition is likely from the Soviet Union in asbestos than in potash markets. A cartel for potash appears distinctly unnecessary.

A Copper Cartel?

Canada does not have a dominant position in world copper production and trade. In 1981, its share of world production was about 8.8 percent. This position has been about the same over the past 30 years. However, in terms of world exports, Canada's share rose from 8.4 percent to 13.6 percent over the period 1966-76.[313] Canadian companies do not have the market strength to set the world price for copper. Even in the Canadian market, Canadian producers must remain competitive with copper imports sold at world prices.

Table 2 indicated the reasons why CIPEC cannot act like a cartel, as it is now constituted. However,

> ...even if all the non-Communist copper producing countries other than the United States, Canada, Western Europe, Japan and South Africa joined CIPEC it would not enable the CIPEC countries to increase their export proceeds by cutting back exports in the long run. Moreover, all of the CIPEC countries are in competition with one another in terms of expanding capacity and, given the long-run national mine capacity objectives of these countries, it is most unlikely that they could reach any agreement on limiting investment in new capacity.[314]

If Canada joined CIPEC as it is now constituted, would its participation be sufficient to reorient the fortunes of that organization? Canadian participa-

tion would not change most of the problems facing CIPEC in the long run: recycling, policy coordination, substitution, and stockpiling by importing countries. In particular, recycling, policy coordination, and substitution present major problems.

An average of about 30-40 percent of copper production is now being recycled in the EEC, Japan and the United States combined, with the rate in the U.S. over 50 percent. The amount of copper production that can feasibly be recycled is 50-60 percent.[315] A significant incentive for recycling is the potential energy saving. According to the U.S. Environmental Protection Agency, 87 percent of the energy used in copper production can be saved by recycling.[316]

Policy coordination in CIPEC could break down, as was suggested above, due to differences over investment plans. Other potentially disruptive factors include differences in production costs which could lead to disputes over pricing;[317] the determination of how production cutbacks should be shared; and the difficulty of persuading associate members (Australia, Mauritania, Papua New Guinea and Yugoslavia) to cooperate with the original CIPEC members on export controls.[318]

As for substitution,

> ...over the long term it seems likely that competition from substitutes has influenced copper prices and helped to limit copper producers in exercising market power.[319]

This trend is likely to continue. If Canada were to join CIPEC, CIPEC's dominance of world copper exports would rise from about 63 percent to approximately 76 percent. According to a study by Charles River Associates, this addition in market strength would aid the CIPEC members' goal of increasing revenues through higher prices most dramatically in the short run; but over the long run, the price of CIPEC-Canada exports is likely to be only 8 percent above the projected price for CIPEC without Canada.[320] But the crucial assumption here has to be that CIPEC and Canada can coordinate policy on such matters as production and prices.[321]

The USA depends on copper imports for 19 percent of total domestic consumption. Its main suppliers are CIPEC and Canada. About 81 percent of the EEC's total consumption is imported, and 75 percent of this is supplied by CIPEC and Canada. Approximately 90 percent of Japan's total domestic consumption is imported; the major sources are Canada (36 percent), Australia (12 percent) and the Philippines (36 percent). Without Australia and Canada, CIPEC would have its greatest short-term gain in the European market; with Australia, gains would develop in Europe and Japan. If Canada were to join, CIPEC's success would be reinforced in Europe and Japan, while better results would be achieved in the U.S. market.

What might be the costs to Canada of participation in CIPEC? There might be less worry about American antitrust legislation affecting potential

participation in a copper cartel than was the case for nickel, but this is difficult to verify because of the problem of pinning down ownership of equity in the copper sector by country of origin. A potentially serious problem for Canada's exporters to the USA could arise if the American government decided to subsidize the production of its massive low grade ores or weaken costly environmental regulations. The USA is the world's largest copper producer and possesses the world's second largest reserves. If this change in U.S. policy took place, over the long run there could be a substantial loss of markets for Canadian exporters.

In summary, participation by Canada in CIPEC, if and only if CIPEC policies were supported by Australia and other LDC producers which are either associate members or outside CIPEC, could be a viable short-run option. But the likely long-run costs (mainly loss of markets due to mining of low grade ores, recycling and substitution) could be greater than the short run benefits (higher prices for producers and more revenues for government). In this light some might argue that an international commodity agreement for copper would appear to be a more pragmatic option in a period of rising demand, but only if producers' interests are paramount. A copper agreement with a small buffer stock fund to defend the floor price, but not large enough to overhang the market and dampen price rises, would be attractive to producers. Such an arrangement, however, would not likely be acceptable to the major importing countries. It is this range of problems that has turned the attention of the Canadian government to a study group for importing and exporting countries as being the most likely compromise solution. So far that approach has not worked.

Conclusion

The cartel option for Canada is certainly not a strong one. This conclusion does not rule out the chance that Canada could participate in a successful but short-lived cartel action for nickel or copper, or perhaps a longer functioning cartel for asbestos or potash. However, without a significant change in market conditions and political attitudes, the cards are stacked against the activation of such cartels.

CANADIAN POLICY ON INTERNATIONAL COMMODITY AGREEMENTS

Canada's overall approach to international commodity agreements was spelled out in a background paper presented in 1977 to a conference on commodities in Winnipeg sponsored by the Canadian Group of the Trilateral Commission.[322] The federal government's position was the result of discussions by five departments:

> Canada's trade policy is oriented principally towards maintenance of a free market trading system and avoidance of direct government interference in individual

transactions. However, the instability of commodity markets is generally regarded as one of the major weaknesses of the international trading system and commodity agreements, though not a panacea, may, in certain cases, provide a practical approach in lending some stability to commodity prices and earnings.[323]

Where international commodity agreements are neither 'appropriate or negotiable', the Canadian government supports study groups composed of producers and consumers. Among the various mechanisms which can be used in ICAs are buffer stocks, production controls, export restraints, market sharing, the encouragement of consumption, and multilateral contracts. The federal government accepts the use of these mechanisms alone, or in concert, as long as they are effective, and only on a commodity-by-commodity basis.

While Canada does accept the notion that ICAs should stabilize the price of a commodity around a growing trend, this trend should very closely reflect the long-term market price. Thus, the Canadian position opposes indexation of the commodity price, tied to any formula based on manufactured imports and fluctuations in exchange rates, as being unnecessarily inflationary. At most, periodic reviews of prices are accepted. With regard to buffer stocks, larger ones are preferred to smaller ones because the former 'allow for more latitude of action'. However, the cost of financing a buffer stock must not outweigh the benefits derived from the ICA.

There is no evidence of provincial interest in international commodity agreements. The only provincial government which has pressed for the adoption of any type of agreement at all is Quebec. Quebec, which has been rather innovative in its mineral policy since the advent of the Parti Québécois government in 1976, has supported a proposal for the creation of bilateral mineral commodity agreements between Canada and the EEC for uranium, which is not produced in Quebec, and for copper which is. The federal response has been negative.[324]

Mining companies in Canada are generally opposed to participation in international commodity agreements. At most, they will support participation in producer-consumer study groups for the exchange of information about production and consumption. For example, Canadian companies send delegates to the U.N.'s lead-zinc study group. On occasion mining company executives will discuss ICAs in some detail. They express the opinion that the volatility of mineral prices creates added risks for investors who may thereby be discouraged from investing or, alternatively, expect higher rates of return, thus eventually raising prices to consumers.

> Aside from the fact that it would make life less complicated for companies such as Noranda, the world in general has a great deal to gain from a successful effort to improve the terms of trade for primary commodities - provided it is done in a reasonable manner. On a pragamatic basis, my concern is that the risk of failure seems very high, and the consequences of failure seem potentially disastrous.[325]

They do point out, however, that mineral prices which are the most unstable are the ones which are not dominated by producer pricing (lead, copper) while the ones which are the most stable are producer priced (steel, aluminum).[326]

It has been suggested that Canada's nickel producers might support an ICA for ocean- and land-based nickel mining if safeguards for production from land-based mines are included and there is strict attention to economic efficiency.[327] But this view is rarely voiced in public, and is not widely shared by other mining company executives.

There are numerous reasons why Canadian mining companies oppose commodity agreements, but probably the major one is that companies feel, given their high degree of competitiveness, that they can ride out recessions as long as they are not overtaxed during more prosperous periods. Other reasons given by the companies are as follows: ICAs have not often worked in the past; bureaucratic interference with the laws of supply and demand is opposed; there is the danger of creating over-investment or under-investment if the ICA price range does not follow market trends; buffer stocks are not the best use of resources in a capital-scarce world; compensatory financing would be a better way of helping LDCs; it is difficult to achieve consensus among producers and consumers; and buffer stocks alone are not adequate to stabilize prices - supply management is also needed and this would be unacceptable to many countries.[328]

Federal and corporate interests tend to determine Canada's response to proposals to join commodity agreements. To date it would appear that the input of the provinces has been minimal, although if an ICA for copper or nickel were to become likely, they would probably take greater measures to express and defend their interests. It should not be taken for granted that the federal government's position will always mirror the corporate position. If that were so, the companies would not be as vigilant as they were in 1980 in commenting on a detailed Energy, Mines and Resources working paper discussing the practicality of a copper agreement. But most important, the Government of Canada has to mirror the concerns of consumers in Canada as well as producers, while taking into consideration the interests and needs of other countries.

In this regard, it is worth exploring briefly why Canada joined the International Tin Agreement.[329] First, Canada was anxious to receive some guarantee of adequate supplies at reasonable prices. Second, since tin is produced in Canada as a by-product of lead-zinc or copper-zinc mining, Canada was anxious to avoid export restrictions. Finally, since Canada could in the future become a primary producer of tin, the government was determined to assure minimum interference with or restriction of mine production. In summary, Canada joined the agreement largely to protect its consumers' interests. Since Canada up to 1983 produced tin only as a by-product, its interests as a producer have been minor by comparison with

its consumer interests.

Matters are more complicated when it comes to the prospect of Canada's joining a copper agreement. According to a study by the Commodities Research Unit (London) in 1978, a sharp increase in copper prices was expected for the period 1982-85.[330] The forecast was based on: the assumption of an annual increase in noncommunist world demand of 3.25 percent;[331] the knowledge that there was insufficient commodities investment in copper in the LDCs because the LDCs were depressing prices by maintaining production in order to maintain revenues; and, the belief that accumulated inventories would not be depleted until some time in 1982. Thus, the study suggested there would be a strong incentive for consuming countries to support a copper agreement in order to dampen price fluctuations and rationalize investment patterns.

Some things have changed in the interim. Copper prices fell throughout 1981 and most of 1982, reaching a level in June 1982 that was, in real terms, comparable with prices at the low point in the 1930s (55.5¢ U.S. per lb.). The copper industry in North America cut back production by 40 percent in order to bring supply into balance with demand.[332] The lack of large inventories, unlike the case for nickel, means that copper prices should rise more quickly with the next economic recovery. However, as we saw in the previous chapter, there appears to be considerable effort under way in both developing and developed countries to bring new copper deposits on stream during the 1980s. We can conclude here by saying that, with the prospect of adequate supplies entering the world market in the 1980s, it seems unlikely that importing countries will favour a copper agreement. It also seems evident that, if copper prices rise dramatically, copper-producing LDCs will not be interested in a copper ICA.

We shall now turn to an examination of some of the potential technical and economic problems that could preclude a copper agreement. The problems facing producers if a copper agreement is signed seem to outweigh any potential advantages. Because price instability for copper is largely due to changes in demand, stable prices would mean lower earnings for copper producers.[333] The narrower the price spread (e.g. ± 5 percent of the target price) to be defended by the buffer stock, the lower the earnings for producers; but the revenue loss would still be high at a wide price spread (e.g. ± 15 percent of the target price). With a narrower price spread, revenue would be greater for some countries (Chile) than for others (Peru). But with the wider price spread, losses would be about equal for all producers.[334]

There is considerable disagreement on this point. Mikesell argues that, since developed countries import more than 75 percent of the world's copper exports, they would gain more from copper price stability than the LDC exporters.[335] Behrman, on the other hand, suggests that the risk-averse LDC producers and risk-averse consumers in the importing countries (who might

otherwise turn to more expensive substitutes) would gain.[336] Lord takes another view:

> consumers do not gain an equivalent amount of producers' losses. The volume of production falls below the efficiency level otherwise reached under an unrestricted market.[337]

In Geneva, in March 1977, Canada proposed a compromise solution in the negotiations between copper importing and exporting countries. Canada's delegate suggested that a producer-consumer study group be established as a possible first step towards, but not necessarily guaranteeing, an ICA for copper.[338] The LDC representatives, notably the chairman of the negotiation session, from Peru, turned down the idea. In March 1979, the United States agreed in principle to discuss various elements which might be incorporated in a copper ICA, but did not agree to support a copper ICA. At the end of the Ford administration and from the beginning of the Carter administration there was a change in general policy. Thus the USA joined the Tin Agreement for the first time in 1976. Since 1976 the USA has joined ICAs for coffee, sugar, and rubber, as has Canada. However, since the advent of the Reagan administration, the USA has dropped discussion of a copper ICA and declined to join the Sixth Tin Agreement.

It appears that a proposal for the USA to accept an ICA for copper would run into considerable trouble. For example, the State Department (which has been divided on the acceptability of a copper ICA) several years ago lost control of commodity trade issues to the Office of the U.S. Trade Representative, which is generally not in favour of ICAs. Other opposition comes from the Departments of Labour, Interior, and Commerce, and from the Department of the Treasury, which, given the climate of opinion favouring tax reductions, has been more concerned about how the taxpayers' money is being spent. Further, the House of Representatives and the Senate are not likely to favour a copper agreement because of pressure brought to bear by the American Mining Congress and U.S. copper companies.[339]

The following discussion presents Canadian officials' views of the prospect of a copper agreement.[340] An international copper agreement containing a buffer stock but no export or supply controls is, in theoretical terms, administratively viable, by and large. Such a buffer stock operation would create more price stability and more revenue stability for producing countries than would be the case without the agreement. There would be a lessening of the loss of markets to copper substitutes, a possible expansion of production capacity and a possible reduction of privately held stocks. The levels of employment in the mining communities dependent on copper would experience improved stability. The major negative result of an international copper agreement would be a reduction in the foreign exchange earnings and government revenues for exporting countries as well as the revenues for

operating companies. The revenue losses by producers mean revenue gains for consumers. The smaller the price range to be defended, the larger the losses for the producing countries. The result would be a major obstacle to continued operation of the agreement.

An international agreement for copper involving both a buffer stock and export or supply controls would probably be administratively unworkable because of the essentially competitive nature of the international copper industry and the numerous, often unaffiliated, independent actors at the mine, smelter, refinery, semifabrication and recycling[341] levels. It seems that such a scheme, were it to work, would increase the revenues of producers more than would be the case for a pure buffer stock agreement. What is in doubt is whether or not an international copper agreement with export and/or production controls coupled with a buffer stock would increase producers' revenues more than if there were no such agreement.

It is inevitable that supply restrictions would adversely affect the production of by-product minerals of copper such as gold, silver and zinc in Canada. In some cases, restrictions on the output from a mine would have considerable effect. For example, at the Afton Copper Mine in B.C. in 1979, gold represented 36 percent of the gross value of production, or $39 million out of a total of $107 million.[342] Further, big nickel producers such as Inco and Falconbridge, which produce not only copper but also gold, silver, platinum group metals, selenium, and tellurium, could lose a considerable amount of revenue if confronted by production and/or export restrictions on copper. These two examples illustrate the primary reason that the mining companies would likely oppose such controls. At the same time, the variety of by-product minerals produced by the private-sector copper companies would (given differing price cycles) help to explain their general lack of interest in even a buffer stock operation. Frequent changes in production quotas could have a negative impact on the investment plans of producers, while potential new producers might be discouraged. The stabilization of prices would possibly be less under such a scheme than a pure buffer stock. There would probably be little discouragement of substitution.

In general then, a pure buffer stock operation would appear to be more viable, although it would probably end up giving the important gains to consumers rather than producers. Estimations of the size of the buffer stock needed to stabilize the price of copper vary with the price spread ($1.5 billion for ± 5 percent to $6 billion for ± 20 percent).[343] One ventured guess is that Canada's contribution would be $300-$400 million, based on its share of world exports. The amount could be less, if price stabilization prevented the accumulation of excess inventories.[344] The attitude of Canadian officials is that this money would be more fruitfully spent on compensatory financing of LDC exports.

There are a few reasons why Canada might join a copper agreement:

a prolonged recession; excessive price volatility, greater than that in the first half of the 1970s; the desire to promote international cooperation and avoid a 1930s-style procurement of resources; promotion of good will with LDCs; with smaller buffer stocks, used mainly to defend the floor price, ICAs can work like producer associations in raising prices above market trends; finally, Canada would join to protect its interests if a copper agreement appeared to be inevitable.

In table 23 we see that copper production in Canada is concentrated in Ontario, Manitoba, British Columbia and Quebec. These provinces are among the richest in Canada, and taxes on copper production do not represent a large share of their revenues. It is too early to determine how these provinces might react to Canada's joining a copper agreement.

TABLE 23

Canadian Copper Mines, by Province, January 1982
(number of mines)

Province	Copper	Copper-Molybd.	Copper-Zinc	Nickel-Copper	Total
Newfoundland	1				1
Quebec	5		4		9
Ontario			4	11	15
Manitoba			11	3	14
Saskatchewan			1		1
British Columbia	6	6	1		13
Total	12	6	21	14	53

Source: The Mining Association of Canada, *Facts and Figures*, 1982, (adapted)

To summarize, as an importer of minerals, Canada is concerned about price, and about access to and security of supplies. As an exporter, Canada is concerned about price and guaranteed markets. It is Canadian policy to approach the prospects and problems of international mineral trade on a commodity-by-commodity basis. This approach has led to variations in Canada's participation in various international mineral-related associations or institutions. For example, Canada has participated in a producer-consumer study group (lead-zinc); an international commodity agreement (tin); and a producer association (uranium). The approach has also meant that, for most minerals, Canada has left matters to international markets and companies.

Canada has joined producer associations, but only where it has strong bargaining leverage as a producer (uranium, and also wheat, which is not discussed here), and apparently only in response to difficult economic

circumstances. Nevertheless, in both these cases, Canada's producer interests dominated the interests of its consumers. On the other hand, Canada joined the Tin Agreement largely out of concern for its consumers' interests. In the case of the study group for lead-zinc, Canada is both a large producer and consumer, and the interests of both are being monitored. Finally, the government is also proposing a study group for copper.

There are various technical, economic and political problems preventing a copper agreement. Canadian officials seem to prefer a study group, in cases where an ICA is considered either economically or politically unworkable. However, if, as it appears in the case of copper, consuming countries would benefit more than producing countries, given a certain loss of market efficiency, one wonders why the consuming countries do not push for a copper agreement. Probably the answer is that they do not see the importance of ICAs in terms of the stability of prices and the balance of revenue flows; rather, they presumably place greater stress on security of and access to supplies, and then only in periods of shortages, at which time price stability and the balance of benefits and costs take on added significance. This would seem to be the case with the Tin Agreement.

In this light, since Canada is both a major producer and a consumer of copper, it would appear that, when the Canadian government assesses the prospect and problems of an international copper agreement, it is the producers' interests which are preeminent. Here we see that the policy of the federal government and the position of the copper companies coincide. A copper study group could serve Canadian interests by gathering production, consumption and trade information. Compensatory financing for LDC copper producers makes more economic sense than a copper ICA.

4. Canadian Resource Diplomacy: Conclusions and an Assessment for Action

Review of Findings

Exporting countries have increasingly sought to impose sovereign control over the mineral development process from the exploration stage to end-product pricing. The motivation for this trend is based on a number of important factors, including:

i the large role played by minerals in the GDP (gross domestic product) of many producing countries and in their foreign exchange earnings;
ii the perception that foreign ownership of domestic mineral deposits by the MNCs of the large importing countries may not complement but rather hinder the national interest of the producing country;
iii domestic political pressures within the exporting countries to ensure that the development of minerals coincides with national plans for industrialization;
iv the asymmetry of power between the mineral exporting and importing countries, and the desire by the exporting countries to redress the imbalance.

Many of the examples of state incursion first took place in the oil sector and were later applied to the mining sector. For example, Mexico nationalized its oil industry in 1939; 50-50 profit sharing was introduced in the oil industry in Venezuela in 1948. In Canada the taxation of windfall profits started first in the oil sector in late 1973 and then spread to the mining sector.

Not all the innovations began in the oil sector, of course. In 1931 Bolivia and Thailand became the first sovereign and independent resource exporting countries to join a minerals cartel (tin). Australia placed export controls on iron ore in 1938 as a conservation measure. The point to be made here is that, while there are no exact parallels of government intervention in the oil industry with that in the mining sector in Canada or elsewhere, mining companies should be aware of developments in the oil sector as one means of identifying and defending their long-term interests and improving their utilization of country risk analysis.

It should be noted that, while nationalization and expropriation by exporting countries were in vogue in the 1960s and early 1970s, the pattern

of intervention has now changed. Greater emphasis is now being placed on joint ventures, performance requirements such as local purchasing, and regulatory tools of government such as profit-remittance restrictions and import licensing.

With the termination of the old colonial empires, the movement of exporting countries to impose sovereign control over their own resources gained support. By 1962, the General Assembly of the United Nations had adopted a resolution (1803:xvii) which stressed that producing nations have a right to permanent sovereignty over their natural resources. Minerals were seen as a country's heritage, a storehouse of treasures that should be safeguarded and passed on to succeeding generations, or utilized in the present to generate growth and development to build a strong foundation for an anticipated better future. This perspective received wider acceptance when, in the 1970s, the United Nations Law of the Sea Conference accepted the notion that minerals on the ocean floor (outside national territorial limits) are the 'common heritage of mankind'.

In this century, the importing countries have emphasized three principles in their relations with exporting countries. The first two principles, *equal access* to resource supplies and *security of supply*, have been of longstanding interest to the consuming countries. The third principle, *equitable prices*, is a response to the increased control of mineral development by the exporting countries in the 1960s and 1970s.

These different principles have naturally led to conflict between importing and exporting countries. With its ties to both, the multinational corporation has literally been caught in the middle, sometimes as a winner, sometimes a loser. Most important, because the MNC has access to markets and capital, a storehouse of expertise, and supply options, it has continued to thrive and succeed amidst the storms of international resource diplomacy in this century. For MNCs, flexibility is the key to survival. For the importing countries this flexibility is essential because of their reliance on foreign sources for such a large part of their mineral supplies. The United Kingdom is totally dependent on imports for 22 out of 27 minerals that we have reviewed; the EEC, 13 of 27; Japan, 14 of 26; and the USA 2 of 27 minerals. Some importing countries are more dependent than others on certain sources of supply:

i the USA, Japan and West Germany are more dependent than other countries on South Africa;
ii Belgium-Luxembourg and France are more dependent than other countries on the rest of Africa;
iii the USA is more dependent than other countries on Latin America and Canada;
iv Japan and West Germany are more dependent than other countries on the United States;
v Japan is more dependent than other countries on Oceania, Asia and China;

vi West Germany, Japan and Italy are more dependent than other countries on the Soviet bloc.

It is obvious that the diversification and procurement practices of the MNCs of the major industrial consuming countries are critical factors in assessing the strengths and weaknesses of Canada's bargaining power. We have discussed the historical domination by the mining companies of the United States and the United Kingdom over international trade in nonfuel minerals, and the increased overseas activity of the French, Japanese and West German mining companies in the 1970s, with governmental assistance. In general, our study indicates that the United Kingdom has developed the most successful nonfuel mineral procurement and diversification strategies, having the greatest degree of diversification combined with the least degree of dependence, comparatively speaking, on specific countries or geographic areas.

The 1960s and 1970s were characterized by a dramatic rise in nationalization of mineral properties by less developed countries. This new risk in the LDC environment encouraged mining companies to shift most of their expenditures on mineral exploration and development to the major mineral-producing countries of the developed world: Canada, the United States, Australia, and South Africa. However, by the mid-1970s mining companies had perceived that the risks had begun to diminish, in comparison with the previous decade. By the early 1980s, countries which had been written off as poor risks, such as Chile, had come back into favour.

In reviewing the capital investment plans of the mining industry for the 1980s we discovered that a number of less developed countries are slated to receive considerable funding, both domestic and foreign, for mining projects (see table 10). Brazil is ranked first, Chile fourth, Indonesia seventh, China eight, India ninth, and Peru tenth. However, Canada is second, Australia third, the USA fifth and South Africa sixth. While the planned amount of expenditure among the top ten is about evenly divided between developed and developing countries, there are three times the number of projects in the developed countries. Thus it would seem that the developed mineral countries are holding their own as recipients of investment in mining. But since about 62 percent of total planned expenditures are likely to go to the developing world, it is obvious that more and more developing countries, such as Guinea, Venezuela, Panama, Philippines, Columbia, Tunisia and Senegal, are becoming attractive to investors and thus helping to swing the balance in favour of the Third World. The minerals which are receiving the most investment attention in both developed and developing countries are aluminum/bauxite, copper, iron ore, lead-zinc, nickel, and phosphate rock (see table 9).

While this development bodes well for the developing countries, it does not resolve ongoing problems such as market access, increased processing,

price stability and so forth. These persistent problems have led the LDCs to either call for or create producer associations, cartels, and international commodity agreements. These efforts have not, by and large, been successful. It has been suggested on occasion that there is a shift under way in the balance of power between the mineral importing and exporting countries. It would be more accurate to state that some countries are making greater advances than others, with the majority being unsuccessful or only moderately successful. In general, the bauxite and mercury producers have been the most fortunate or skilled in utilizing resource diplomacy. The copper producers (CIPEC) and others have fared far worse.

The only operative mineral commodity agreement is the International Tin Agreement, and it has survived more because of political support from the developed countries than because it is a viable economic system. While the EEC's incipient preferential market access scheme Sysmin for 58 or so developing countries has offered some degree of stability for LDC export revenues, this is a token gesture by the EEC more than a full-fledged commitment to assisting the LDCs.

In general, it can be concluded that increased mineral development in the Third World will gradually make the developed countries more dependent on the less developed countries. But this transition will be a slow one, with some countries such as Brazil racing far ahead of others. LDC efforts to develop cartels will come in waves, rising with supply shortages and falling with surpluses. Price instability for most minerals will keep up LDC pressures for international commodity agreements, but these efforts are not likely to bear fruit.

The resource diplomacy debate in Canada is not over; it will continue as long as Canada is a mineral-exporting country, sometimes rising to prominence during recessions but more often during periods of shortages. None of us wants to admit that we have weaknesses. Instead we often convince ourselves that we have strengths that tower above our weaknesses. This psychological game lies at the core of wishful thinking concerning Canada's nonfuel mineral resource wealth and its bargaining power in international resource diplomacy. Many Canadians are convinced that Canada's mineral wealth provides us with all the bargaining power we need to get what we want from our major trading partners. This emphasis on our mineral strengths obscures weakness in the manufacturing sector. It also hides the variability in the marketplace for each mineral that Canada produces and exports.

Resource diplomacy has taken on a one-sided meaning since the Organization of Petroleum Exporting Countries (OPEC) first raised the price of oil by 400 percent in 1973-74. Simply put, this concept of resource diplomacy meant more money for the producers and less for the consuming countries. The oil price surges in the 1970s and early in 1980 brought the international economic system through two devastating recessions from which

it has still not recovered. However, the current collapse in oil demand has greatly weakened OPEC and stands as a lesson to all that one-sided resource diplomacy in an interdependent world eventually wreaks havoc on its practitioners.

Canada possesses many advantages for attracting both domestic and foreign investment in nonfuel mineral exploration and development. These advantages include a highly developed social and economic infrastructure, an excellent data base, managerial and technical expertise, a high level of productivity in mining, a high degree of security of land tenure, a competitive tax system, a high degree of economic and political stability, and a broad diversity of minerals often found in massive quantities and in competitive grades or quality.

In the 1960s and 1970s, four developed countries, Canada, the USA, Australia and South Africa, were attracting 80 percent of mineral exploration and development expenditures in the noncommunist world. While there appears to be a considerable shift under way in the flow of these expenditures from the developed to the developing world, Canada's advantages have left the country in a good position. A preliminary estimation of world (excluding the USSR) mining industry capital investment plans reveals that Canada is second to, and almost tied with, Brazil as the preferred first choice of locale for investment. The conclusion here should be self-evident. Canada's primary strength as a mineral-exporting country comes from the broad range of minerals that it produces. The opportunities to exploit Canada's advantages will be present only as long as Canada provides the right climate for investment, that is to say, a climate which offers a rate of return equal to or better than that offered in competing mineral producing countries. The more attractive Canada is as a locale for investment, the stronger its general bargaining power will be *vis-à-vis* the major industrial importing countries. Canada's specific bargaining strength will depend on the market features for each mineral that it produces and exports.

The approach that the Canadian government has taken on mineral issues in international relations has evolved from a number of important background factors:

i the small role that minerals play in the country's gross domestic product, in contrast to the situation in most or all of the LDC mineral-exporting countries;
ii the broad variety of minerals produced in Canada and exported, in contrast to the situation in the LDC mineral-exporting countries where one mineral tends to dominate;
iii the generally positive trend for the terms of trade of Canadian exports since the end of World War II;
iv the predominance of the USA as a market for Canadian mineral exports;

v the predominance of private (domestic and foreign) ownership rather than public ownership;
vi the small role played by the provinces, until the last decade or so, in helping to formulate Canada's foreign policy stance on mineral issues.

These are probably the key background factors that have led to the case-by-case or commodity-by-commodity approach presently pursued by the Canadian government. This policy is justified by the government as offering the greatest flexibility in decision making.[345] There is something to be said for this approach:

...foreign policy is, or should be, a largely pragmatic undertaking. Many of the relevant factors are beyond the control of individual governments, even those of superpowers. Attempts in particular situations to derive unambiguous policy guidance from first principles are rarely successful.[346]

Nevertheless, it is possible that strict adherence to the principle of flexibility may have its weaknesses. As Leslie Gelb has written in the context of American foreign policy:

the ethos of maintaining flexibility is exceptionally strong in the diplomatic profession, and the more flexibility one seeks, the more vacuous the policy. Policy is purposeful behaviour - something specific is to be achieved by making certain maneuvers and sacrifices. Flexibility, when sought almost as an end in itself, means to ride the waves and make the best of whatever happens.[347]

In other words, there is the danger that an overemphasis on taking a flexible approach in all cases means a greater likelihood of a government's pursuing a reactive rather than an active foreign policy. This argument, however, should not be interpreted as a denial of the importance of flexibility and pragmatism. Rather it is an argument in favour of making efforts to look for constraints as well as opportunities.

It is Canada's official position that it is not present '...policy to use...raw material supply as a political tool.'[348] However, the case of uranium (the embargo more than the cartel action) has challenged this. This challenge is by no means a denial of the case-by-case principle which so strongly influences government policy. Nevertheless, it seems possible that Canada's pursuit of mineral policy objectives on a case-by-case basis may dilute the advantage that Canada possesses in producing and trading a large number of minerals in one of the most favourable political climates in the world. Given that there are now about 1,000 mineral discoveries awaiting development in Canada, it seems incumbent on policy makers to assess and utilize the advantage that this implies.

It is worth contrasting the view of resource diplomacy held in Canada with that expressed by commentators in the USA. The Canadian position is that

resource diplomacy... is the management of international relations - mineral relations - by negotiation. In large part, Canada's resource diplomacy is simply an external manifestation of its mineral policy.[349]

According to C.F. Bergsten, a former top official in the U.S. Treasury Department and a man not unknown for his sympathetic understanding of the problems facing mineral-exporting countries,

resource diplomacy is the manipulation of market imperfections by exporting countries, alone or in concert, for maximum economic and political gain.[349]

The difference in emphasis and definition noted here can be said to characterize the differences of opinion between resource exporting and importing countries. It should not be inferred from this comment that Canada's actions in resource diplomacy will necessarily be similar to those of the LDCs. We have previously presented arguments (based on comparisons of mineral production as a percent of gross domestic product, the contribution of the most important mineral export to foreign exchange earnings, and terms of trade) to show why Canada is likely to pursue its version of resource diplomacy in a manner different from that of various LDC mineral exporters.

In fact, Canada's position on mineral resource issues may be most aptly described as 'independent', with the qualification that Canada's position may sometimes be similar to the position of various LDCs:

there is... a disparate group of relatively developed nations (the Soviet Union, China, Australia, Canada) whose self-sufficiency or super-sufficiency in many resources offers them both insulation from the increasing political and economic pressures of (resource) dependence and also the option of acting to advance their own interests in a situation created by the imposition of such pressures on others.[351]

What does it really mean when we say that Canada is an 'independent' mineral resource producer? Does it mean that Canada has no constraints on its actions in resource diplomacy? In the past, some commentators have expressed the opinion that Canada has no power to utilize its possession and trade of minerals to gain diplomatic bargaining leverage with its major trading partners or with the MNCs of the importing countries.[352] On the other hand, it has been stated that Canada has almost unlimited bargaining leverage because of its mineral resources.[353] As we have demonstrated, both of these assumptions are inaccurate.

Some of Canada's most significant weaknesses as a mineral-exporting country are determined by the strategies of resource procurement and supply diversification developed by our major industrial trading partners. Certain countries depend heavily on others for their mineral supplies. The three nations most reliant on Canada for nonfuel mineral supplies are the United States, Japan and the United Kingdom. In my analysis I have concentrated on Canadian mineral exports, which account for at least 40 percent of the total domestic consumption of Canada's major trading partners. Utilizing

this method I calculated that Canada has the potential for bargaining leverage with:

i the United States, for asbestos and potash;
ii the United Kingdom, for cobalt, nickel and asbestos;
iii West Germany, for asbestos;
iv France, for asbestos.

If we lower the benchmark to 30 percent, then Canada has additional potential for bargaining leverage with the USA for nickel and zinc and with West Germany for zinc. After reviewing various factors such as the possible mining of the seabed, export income stabilization schemes, stockpiling, substitution, and recycling, I determined that the only realistic candidates for unilateral leverage are asbestos and potash, and there are real doubts about asbestos.

Of course, unilateral leverage is not the only means of exercising power in resource diplomacy. Other options are producer cartels and international commodity agreements. My analysis of producer cartels in which Canada might participate included the studies of asbestos, nickel, potash, and copper reported in chapter 3, and summarized below.

Conditions for an asbestos cartel are not ripe. A cartel for potash is unnecessary. In my investigation of the prospects for a nickel cartel I found that there are numerous problems, varying combinations of which could not only undermine the viability of a nickel cartel but also lead to a future loss of markets in the major importing countries. I therefore concluded that an international study group for nickel was a more likely prospect than a cartel or even an international commodity agreement. The motivation of importing countries to support an international commodity agreement for nickel would be reduced significantly if the USA, the U.K., France, West Germany, and Japan were to subsidize ocean mining. In such a case, nickel-producing countries might be forced to develop a cartel to protect their interests. At present such problems appear to be at least ten years away. In the meantime we can expect some stiff competition in the international nickel industry.

While copper is one of the most important minerals produced in Canada, it is not one in which Canada has any unilateral leverage with its main trading partners. Canadian participation in a copper cartel with the present CIPEC members could lead to successful results, at least in the short run, only if Australia and the major associate members in CIPEC agreed to participate, and if all the members agreed to coordinate policy without exception. This is an unlikely prospect.

The basic thrust of Canadian policy on mineral exports is support of the free market trading system, avoidance of direct government interference in individual transactions, and avoidance of using mineral exports as a political tool; however, there are certain specified exceptions. These exceptions are:

i restrictions on exports in compliance with Canada's COCOM commitments, or to support Canada's nuclear safeguard goals, or to buffer an industry in serious economic difficulty (e.g. potash);
ii participation in international commodity agreements to support the interests of consumers (e.g. tin);
iii stockpiling to support an industry in distress (e.g. uranium);
iv aid to Third World countries (signature of the Common Fund Agreement).

These exceptions underline the principal attitude of the Government of Canada in deciding what course of action to take in Canadian participation in international mineral markets: *each mineral is treated on a case-by-case basis*. This operating principle seems to be the most sensible approach possible.

The relevance of Canada's participation in mineral cartels and international commodity agreements is questionable. Such ventures are more likely to bring into conflict rather than harmonize Canada's general goals of resource diplomacy. To recapitulate, these goals are:

i maintaining or increasing government tax revenue;
ii maintaining or increasing net foreign exchange earnings;
iii maintaining or increasing employment and skill advancement;
iv maintaining or increasing domestic control and ownership;
v maintaining the good will of Canada's main trading partners and the mining companies.

The only effective long-run strategy that Canada can utilize to harmonize and attain the general goals of resource diplomacy is to improve the competitive viability and market access for Canadian mineral exports.

Recommendations

COMPETITIVE VIABILITY AND IMPROVED MARKET ACCESS FOR CANADIAN MINERAL EXPORTS

Probably the key problem that Canadian mineral exporters will face in the future is a combination of improving competitive viability and improving access to foreign markets. The following steps are recommended to assist in enhancing and creating Canada's advantages.

i The Government of Canada and the provinces should make a major effort to lure Western European, Japanese and American firms to participate in joint ventures with Canadian mining companies especially for the following minerals: copper, platinum group, cobalt, tantalum, nickel, mercury, tungsten, asbestos, columbium, potash, selenium and zinc. This effort would help to ensure a commitment by Canada's major

trading partners to Canadian sources of supply. This emphasis on joint ventures would help to deal with the escalating capital costs of mineral development, while at the same time setting the groundwork for increased Canadian exports of more-fully processed minerals. Canada should sponsor conferences in Europe, Japan and the United States concerning mineral opportunities in Canada. Japanese, American and European companies should subsequently be invited to Canada for discussions with Canadian mining companies. FIRA's 'significant benefit' criteria should be somewhat relaxed, and priority given to quick processing of American, European and Japanese applications for investment in new business in these areas. Priority should not be given to acquisitions of existing businesses except where warranted by unusual circumstances.

ii The Government of Canada should begin a campaign to stress with its military alliance partners the economic aspects of the NATO and NORAD agreements. Article 2 of the North Atlantic Treaty states that the treaty members 'will seek to eliminate conflict in their international economic policies and will encourage economic collaboration between any or all of them.' To date the economic ties in NATO have been minor considerations. Mineral resources are not covered by the NATO agreement. While Canada and the USA have had a defence production sharing program since World War II, minerals are not currently part of this program. Canada should encourage its military partners to include specific references to minerals in their alliance agreements. Too often in the past, U.S. mining companies have spuriously cloaked their appeals for import protection in the U.S. market with appeals to national security. They have maintained that foreign mineral sources (including Canadian uranium, potash, zinc, lead and copper) are unreliable and that U.S. domestic producers need to be protected from foreign dumping, to enable them to maintain operations and to serve national economic and military interests in peacetime and wartime. Contradicting this line of reasoning are various statements by U.S. officials that Canadian minerals are considered to be reliable and essential for U.S. national security. If minerals become part of North American defence production sharing, U.S. mining companies will no longer be able to appeal to the International Trade Commission to bar entry of Canadian minerals on national security grounds. The inclusion of minerals in the NATO agreement could also help Canadian mining companies to become preferential sellers to the government commodity stockpiles in the USA and any such similar programs developed by our European allies.

iii The Government of Canada, recognizing the artificial nature of international oil prices, should continue a policy of keeping Canadian oil costs at less than the world price to offset subsidized mineral

production in other countries.

iv The Government of Canada should recognize the long-run competitive value of having a dollar which is lower than the U.S. dollar.

v The Government of Canada should not encourage Canadian mining companies to buy their inputs in Canada if they cost more than comparable foreign inputs.

vi The Government of Canada should work in cooperation with the provinces so that the mining tax regime becomes stabilized over the long term, acknowledging that the mining industry is inevitably cyclical, that profits rise and fall, and that mining companies balance income from good years and bad years. Perhaps income averaging might be appropriate. Consideration might also be given to allowing tax incentives for improved mining and mineral-processing productivity based on self-generated lower costs.

In general, taxation of the mining industry should always take into consideration the tax regimes in countries which compete with Canada.

vii The Government of Canada should encourage more Canadian mining companies to integrate forward into consuming-country markets.

viii The Government of Canada should target part of its foreign aid to competing LDC mineral producers so as to encourage a diversification in their economies, reduce their dependence on mineral exports, and thus reduce their incentive to maintain levels of mineral production and exports during market downturns.

ix While the Government of Canada should encourage Canadian companies to sign long-term contracts which reflect market rates, it should recognize that long-term contracts for ores and concentrates undermine Canada's goal to process more at home.

x The Government of Canada in cooperation with other GATT nations should make a concerted effort to induce the USSR to join GATT and to become subject to the discipline of existing international trade rules and regulations, particularly as regards mineral exports. If the USSR is unwilling to agree to this request, Canada should encourage the OECD countries to impose countervailing duties, where warranted, against Soviet minerals which are dumped in Western markets.

xi The Government of Canada should not offer financing at less than market rate for any mineral projects in Third World mineral-exporting countries where such ventures would eventually compete against Canadian exports.

xii The Government of Canada should encourage the development of private

Canadian trading companies which can deal expertly with barter-trade and countertrade demands from LDCs and Soviet bloc countries.

CARTEL PARTICIPATION

There is no present urgency for Canada to join a cartel for any mineral. With the exception of participation in the uranium cartel in the early 1970s, the Government of Canada has consistently opposed membership in a mineral cartel (e.g. nickel, copper, iron ore). The mining industry also opposes the creation of cartels, as does the Progressive Conservative party.

From a strategic viewpoint, the foreclosure of any option which may have viability is absurd. Circumstances change and old policies can be quickly outmoded. Douglas Rosenthal, a former U.S. Justice Department official who spent 6 years investigating the Uranium Marketing Research Organization, stated that uranium-producing countries, including Canada, were justified in creating the cartel in response to Washington's 'blatantly protectionist embargo' on foreign uranium imports.[354] However, as we have demonstrated, most minerals are not subject to cartelization. Some argue that, since the Soviet Union and LDC mineral producers often continue to maintain or increase exports when world demand drops, the mining companies in the developed market economies will always be victimized. Thus, the argument goes, a cartel is necessary to maintain viable production facilities in the developed world. One commentator recently said:

> if it is all right for oil, why not nickel? Otherwise free enterprise producers will always get hit when things turn bad.[355]

There is, however, a considerable difference between oil and nickel in terms of fulfilling the requirements for a cartel. Furthermore, even OPEC has experienced considerable strain since 1981, and has been unable to maintain discipline among its members. At OPEC's meeting in December 1982, many members wanted increased quotas despite the fall in demand: e.g. Iran (216 percent); Venezuela (33 percent); Indonesia (15.4 percent); Nigeria (15.4 percent); and Iraq (83 percent). Throughout 1982, Iran, Libya and Nigeria were producing over quota and selling under the posted price. No agreement was reached on production quotas. At the same time, major buyers from Saudi Arabia (the USA, Japan and Brazil) put pressure on Saudi Arabia to reduce prices to compete with the prices offered by other cartel members.[356] Further trouble confronting OPEC came from the increase in supplies from countries outside OPEC, including Britain, Norway, Mexico, and the USSR. It is now evident that even the most powerful cartels will be greatly weakened by a significant downturn in demand unless the cartel can avoid price competition among its members.

If there is any mineral produced in Canada for which a cartel may become attractive, it is asbestos. The long-run outlook for asbestos demand is poor:

little growth for the rest of the decade. Environmental concerns about asbestos have been a major factor in dampening prospects for the mineral. Another mineral which has gone through a transition to declining consumption largely for environmental reasons is mercury; and just as with asbestos, there are few producing countries for mercury. Of interest here is the current cooperation between the Soviet Union and other mercury producers (Spain, Italy and Algeria) in restraining exports in order to bolster prices. It would appear that asbestos prices might fall severely some time during the remainder of this century in response to declining demand. Options to rescue the industry should include the possibility of Canadian participation in an asbestos cartel (tacit or open) with the Soviet Union and South Africa. Recently, however, asbestos prices have not been doing badly. The price per tonne (f.o.b. mine) increased from $271 to $390 over the period 1977-81, an increase of 44 percent, just about even with the rate of inflation.[357]

One of the ongoing problems that Canada could face if it joins a cartel is the extraterritorial extension of U.S. antitrust laws. Such would be the case if U.S. subsidiaries were participants and if the U.S. market price were affected. However, U.S. Justice Department action against U.S. companies which abided by Saskatchewan's prorationing regulations in the early 1970s and participated in the uranium cartel during the same time resulted in no adverse court decisions. But the judicial process for this kind of case in the USA can be lengthy and expensive, and this alone, aside from criminal charges and fines in the event of a guilty verdict, can act as a deterrent against U.S. company participation, through subsidiaries, in a cartel sponsored by the Government of Canada.

One could argue that the potentially disruptive effect of U.S. antitrust legislation on possible participation in future cartel activity would strain Canadian-American relations, in the event that the U.S. market were affected. But these problems could be avoided by organizing Canadian exports to markets outside of North America under one marketing agency (somewhat like Canpotex for potash) and placing an export tax on exports of the mineral concerned shipped to the United States.

It should be remembered that, while U.S. law does not sanction price fixing in the domestic market, the same is not true for the world market. Under the protection of the Webb-Pomerene Export Trade Act of 1918, U.S. corporations are exempt from liability and prosecution for price fixing outside the U.S. market, provided that the domestic market is not affected in terms of prices or the availability of supplies. Two cases where such tolerance has been shown in the recent past involve U.S. sulphur and phosphate producers.[358] A little further back in history we find another example. In 1938 U.S. potash producers formed the Potash Export Association under the protection of the Webb-Pomerene Act. The price of U.S. potash exports soon climbed to about the same level as that set by the European potash cartel.[359] This potash association is no longer in existence. We have noted

previously that U.S. oil companies are given an exemption from antitrust prosecution to enable them to negotiate as a group with OPEC. This double standard in the USA would, at the very least, suggest that any psychological barrier characterizing official thinking in Canada about participation in cartels should be reassessed.

In 1978 Ritter[360] recommended that Canada join limited purpose producer associations and not cartels so that Canada could better scrutinize MNC transfer pricing, strive to standardize taxation among producing nations to prevent tax-cutting competition, and share general information. This is an acceptable suggestion only insofar as the cartel option is kept open. However, should Canada join CIPEC (copper) or APEF (iron ore), and should these organizations decide to attempt cartel action which Canada considers untimely or which might discriminatorily and negatively affect the interests of Canadian producers, Canada should withdraw immediately.

INTERNATIONAL COMMODITY AGREEMENTS

The Government of Canada opposes an international commodity agreement for copper or nickel. Instead, it favours a study group for each, to gather information on production, consumption and trade. This position is supported by the Canadian mining industry. In a study for the Economic Council of Canada, Ritter concluded that, while certain regions and minerals produced in Canada could be positively affected by price stability,

> export instability has in recent decades been a non-issue in the Canadian political-economic agenda, largely because the phenomenon in aggregate has been almost absent.[361]

An ICA for copper is not feasible for various technical and economic reasons. An assessment of an ICA for nickel is not possible here. Given widely divergent projections for nickel (shortages before the end of decade or surplus capacity until the end of the century), it would be wise for the Government of Canada to fund an investigation of the feasibility of a nickel ICA.

This study has concluded that compensatory financing is a better method than ICAs of stabilizing revenues for LDC mineral exporters. But compensatory financing is only a short-term solution to LDC problems. The Canadian government should utilize its foreign aid programs to encourage LDC mineral exporters to diversify their economies. The government should also lower its tariff and nontariff barriers to the nonmineral exports from mineral exporting countries in the Third World and encourage Canadian investment in these areas.

Neither ICAs nor compensatory financing for LDC mineral exports are of benefit to Canadian producers. When Canada supports compensatory financing, it does so as a clear demonstration of its support for the urgent needs of Third World countries.

In 1982 a debate began in Canada concerning the creation of a government-financed stockpile for nickel.[362] Organized labour, supported by some analysts, maintained that such a stockpile would have an immediate and valuable impact. Inco's nickel mines in Sudbury and in Thompson Manitoba would be reopened, miners would go back to work, local economies would be revived and there would be an increase in nickel prices. Both the mining companies and the federal government opposed such government intervention as likely to have a depressing effect on prices and profits when the stockpiled nickel is sold in the market.[363]

Stockpiling nickel at a time when Inco already had months of supplies in inventories (110 million pounds in December 1982) does not make economic sense. If Inco had little or no inventory, the attractiveness of stockpiling would obviously increase. But there would remain the need to ensure, as the U.S. stockpile authority tries to do, that minerals are sold from the stockpile in a manner that does not dampen market or producer prices.

Government stockpiling does exist in both the United States and Japan. While much of the U.S. stockpile's mineral acquisitions are from foreign sources, there are some purchases from domestic mining companies. For example, in October 1981 the Senate Committee on Banking, Housing and Urban Affairs considered legislation to stimulate domestic production in cobalt.[364] The U.S. stockpile would likely make purchases from domestic cobalt producers. As we saw in chapter 2, domestic U.S. producers of copper and other minerals have had access to the U.S. stockpile's buying programs for various reasons. Japanese government stockpiling is not used to support domestic mining producers, but it is used to buy excess inventories (e.g. zinc) from domestic smelters during recessions.[365] Finally, it should be remembered that a Crown corporation, Uranium Canada, stockpiled uranium during the late 1960s and early 1970s when uranium prices were depressed. It has been suggested that 'only a Canadian government stockpile prevented total collapse of the industry.'[366]

The key questions concerning distress stockpiling versus import security stockpiling focus on the state of the domestic economy, the market outlook for the mineral in question, the financial state of the producing companies, and the economic well-being of the communities where the mineral is produced. Sometimes individual companies have the financial strength to ride out lengthy market slumps. In the 1930s, Sir Ernest Oppenheimer, chairman of De Beers Consolidated, reportedly 'averted a collapse of the diamond market by stockpiling large quantities of stones at great personal financial risk.'[367] Sometimes government intervention is required, as was the case with uranium in Canada in the early 1970s.

As we noted earlier, the uranium industry faced restrictions in the U.S. market for nearly 8 years before the Government of Canada intervened. In

order for similar intervention to take place for another mineral, inventories would have to be down to a few months' supplies, with little prospect of a major market recovery for at least a year or two.

The financing of a stockpile can take various forms:

i outright government purchase with the government having marketing rights;
ii outright government purchase with the provision that the minerals will be resold to the mining companies;
iii long-term low interest loans from the government to the producers;
iv interest rate buy-downs from the government to the producers.

If a stockpile for nickel or any other mineral becomes necessary in the future, the government should consult with the mining community about the most suitable method of stockpiling. Since government policy is to take a 'commodity-by-commodity' approach, ministerial statements to the effect that aid to one mineral sector would create political jealousies and demands in other sectors are not very convincing.

RESEARCH DIRECTIONS

i Substitution: there already exists a considerable degree of substitutability between minerals and nonminerals such as plastics and ceramics. With the evolution of research and development in this field, greater progress in substitution is anticipated. The federal and provincial governments of Canada and the mining industry should sponsor detailed commodity studies on trigger prices for mineral substitution. Such studies would help to determine when taxation in Canada (as a cost of doing business) might trigger substitution, and inform mining companies when their payments for factors of production were becoming too high. This information should be updated continuously.

ii Recycling: The federal and provincial governments and the mining industry should develop systematic information about the recycling rates for minerals achieved by Canada's major trading partners. This information should be updated continously.

iii International commodity agreement for nickel: the federal government should fund an independent analysis to determine the potential viability of an international commodity agreement for nickel (as was done for copper).

iv International competitive position of the Canadian mineral industry: the Government of Canada should expand its analysis of the international competitive position of Canadian producers beyond nickel, copper and zinc to include other minerals such as potash, asbestos, iron ore, etc. Such analyses should take into consideration the cautions and suggestions of the mining industry at home and abroad.

v Government distress stockpiling: the Government of Canada should officially investigate the necessity of a stockpile for any Canadian-produced mineral which is competitive internationally but whose future is jeopardized by severe economic conditions.

Concluding Remarks

I would like to conclude by identifying major challenges that Canada has to overcome if it is to guarantee its effective survival as a major mineral producer.

i The continued diversification of supplies by Canada's major trading partners: to counterbalance this trend, Canada must intensify its efforts to be seen as a secure supplier of minerals at a competitive price, while developing innovative approaches to market access.
ii Subsidized production in less-developed countries: to counterbalance this development, Canada should encourage the diversification of the economies of LDC mineral exporters.
iii Preferential market access schemes for LDC mineral producers: to counterbalance this development, Canada must pursue new innovative approaches to market access.
iv Stockpiling: Canada should make vigorous efforts to gain preferential market access to foreign government stockpiles.
v Recycling and substitution: Canada must sponsor research to stay in touch with the latest trends and implications for mineral producers, and have this information disseminated widely in Canada.
vi The business cycle.
vii Protectionist policies of other countries.

The latter two challenges may well seem intractable. On these matters I have only two comments: continue efforts to remain competitive, and lobby for free trade.

Canadian policy is not typically oriented toward confrontation in international relations. That is well known. But neither should Canada's patience be unlimited. What Canada seeks is to develop its exports of processed minerals, and more particularly, its exports of manufactured goods which do not have a direct mineral base (e.g. telecommunications equipment and transportation systems). It does not pursue this path hoping to unload uncompetitive, overpriced goods on the world market.[368] In that sense, Canada is willing to play by the rules. What is aggravating, on the other hand, is the existence of protectionist tariffs (a phenomenon not unknown in Canada) and the proliferation of nontariff barriers that deny Canada access to markets where it could otherwise compete in terms of price and quality. Fine words from the Europeans, the Japanese, and the Americans recognizing

Canada's desire to process its resources more fully before exporting them become window dressing when they are not followed by action.[369] It is this which tries Canada's patience.

None of this is meant to suggest that Canada is about to reorient its policy and become more confrontational: it is merely a recognition of a strong undercurrent of feeling in the country. Pressures are building in Ottawa and the provinces to reshape the country's economy. If Canada's major trading partners are not responsive to the growing needs that this change implies, it is possible that some day Canadian policy makers are going to look to their reservoir of strengths to help solve the problem. When that day comes, nonfuel minerals will receive much more attention.

In 1977, Prime Minister Trudeau commented that

> increasingly, the allocation of the world's resources is becoming the subject of international negotiation. Ensuring that Canada's interests are fully served in such negotiations is a growing responsibility but one to which, I assure you, my government is firmly committed.[370]

This being the case, it is imperative that both the federal and provincial governments take a more systematic look at Canada's mineral position with respect to production and trade. Failure to do so could very well mean the loss of important opportunities to exploit Canada's bargaining leverage through resource diplomacy. It could also mean untimely and incompetent attempts to exploit some leverage where opportunities are outweighed by constraints. It is to be hoped that this discussion will provide some insights and guidelines for enlightened thinking about resource diplomacy and Canada's external relations.

Appendix I Mineral Uses

Mineral	General Uses	Military and Space and Nuclear Industry Uses
Asbestos	23% - asbestos cement pipe 19% - flooring products 11% - asbestos cement sheet 9% - roofing products 8% - paper 5% - coatings and compounds 4% - packing and gaskets 3% - textiles 2% - plastics 1% - thermal insulation 1% - electrical insulation	Insulation for rockets and missiles; Astronauts' space-suits.
Cesium	The uses of cesium are limited largely because of its high cost and volatility. Major civilian uses include metal detectors and thermionic power generation.	Rocket fuel for missiles and spacecraft; Infrared sniperscopes; Nighttime signalling and surveillance devices; Homing devices in interceptor missiles.
Cobalt	29% - electrical industry 18% - aircraft industry 20% - machinery industry 12% - paints 10% - ceramics and glass 7% - chemicals	Spacecraft and aircraft electronics; Jet aircraft frames; Armour piercing shells.
Columbium	40% - construction industry 18% - oil and gas industries 20% - machinery industry 20% - transportation industry	Jet engine turbine blades; Rocket nozzles; Fuel element cladding in nuclear reactors.
Copper	61% - electrical industry 14% - construction industry 10% - industrial machinery 8% - transportation	Cartridge and shell cases; Navigation and communication systems; Projectile fuses.

Mineral	General Uses	Military and Space and Nuclear Industry Uses
Nickel	21% - transportation 15% - chemicals 13% - electrical equipment 10% - fabricated metal products	Armour plate; Gun forgings; Bullet jackets; Jet engines; Spacecraft and aircraft frames; Turbo superchargers; Nuclear reactor structural material.
Potash	95% - agricultural fertilizers 5% - batteries, soap, T.V. picture tubes, vitamin pills, fire extinguishers, glass, ceramics, textiles, dyes, matches, fireworks, preservatives for meat, antiseptics, metallurgical flux	Astronaut breathing equipment; Explosives; Possible substitute for cesium as rocket fuel for missiles and spacecraft.
Selenium	45% - electronics (photoelectric cells; rectifiers) 34% - ceramic and glass colouring	Solar energy cells; Spaceship and aircraft electronics; Delayed action blasting caps; Lasers.
Tantalum	64% - electronics (e.g. capacitors, superconducting wiring) 24% - machinery 10% - transportation	Computers; Aerospace structures; Jet engines; Space power systems; Thermocoupler and structural material in nuclear reactors.
Zinc	39% - construction industry 30% - transportation industry	Various uses in aircraft, tanks, artillery.

Sources: W.R. Jones, Minerals in Industry (London: Pelican Books, 1955); MM, *Basic Data for Estimating U.S. Mineral Requirements and Availability*, Washington, 1976; MAC, *What Mining Means to Canada*, Ottawa, 1974, p. 57; G.O. Vagt, *Asbestos*, MR 155 (Ottawa: EMR, 1976); *Northern Miner*, November 27, 1975; Bureau of Mines, 1970 and 1976.

Appendix II World Mineral Reserves: Percent Share By Country or Area, 1981 Estimates

Mineral	Country or Area	Percent Share
Antimony	Bolivia	8.2
	South Africa	7.2
	Mexico	5.0
	USA	2.6
	Yugoslavia	2.0
	Other CPE[a]	59.2
	Other ME[b]	15.8
Asbestos	Canada	35.6
	CPE	26.9
	South Africa	21.2
	Other ME	12.5
	USA	3.8
Bauxite	Guinea	26.3
	Australia	20.5
	Brazil	10.3
	Jamaica	8.9
	India	5.4
	Guyana	3.1
	Greece	2.9
	Surinam	2.7
	Other ME	14.3
Bismuth	Australia	18.9
	Canada	15.8
	Bolivia	14.4
	Japan	13.5
	USA	9.9
	CPE	7.2
	Mexico	6.3
	Peru	4.5
Cadmium	Canada	17.6
	USA	16.2
	Australia	14.0
	Japan	2.9
	Mexico	2.9
	Other ME	35.3
	CPE	11.0
Cesium[c]	Canada	75.0
	Zimbabwe	26.7
	Namibia	6.7
Chromium	South Africa	67.6
	Zimbabwe	29.7
	Finland	0.8
	CPE	0.6
	Turkey	0.1
	Philiipines	0.04
	Other ME	0.4
Cobalt	Zaire	38.2
	CPE	13.2
	Zambia	11.8
	USA	10.3
	Philippines	5.9
	New Caledonia	2.9
	Australia	1.5
	Morocco	1.5
	Canada	0.9
	Botswana	0.9
	Other ME	12.4
Columbium[d]	Brazil	93.4
	Canada	3.5
	Nigeria	1.8
	Zaire	0.9
Copper	Chile	19.2
	USA	17.8
	USSR	7.1
	Zambia	6.7
	Canada	6.3
	Peru	6.3
	Zaire	5.9
	Philippines	3.6
	Australia	3.2
	Papua New Guinea	2.8
	Poland	2.6
	South Africa	1.0
Gold	South Africa	58.3
	USA	5.8
	Canada	2.5
	Other ME	17.5
	CPE	15.8

Mineral	Country or Area	Percent Share
Gypsum	USA	14.9
	Canada	10.3
	France	8.6
	USSR	8.3
	Spain	7.8
	Iran	5.0
	U.K.	4.6
	West Germany	3.2
	P.R. of China	2.9
Ilmenite	Canada	25.2
	Norway	21.2
	India	20.2
	South Africa	15.1
	Australia	7.2
	USA	6.6
	CPE	2.1
	Finland	1.4
Iron Ore[e]	USSR	28.7
	Brazil	20.0
	Australia	10.9
	Canada	8.5
	India	5.7
	USA	5.4
	South Africa	3.8
	P.R. of China	2.8
	Sweden	2.0
	France	1.7
	Venezuela	1.3
Lead	USA	26.7
	CPE	16.4
	Australia	13.9
	Canada	13.3
	Yugoslavia	3.6
	Mexico	3.0
	Peru	2.4
Manganese	USSR	44.4
	South Africa	40.7
	Australia	6.1
	Gabon	2.9
	Brazil	1.6
	India	0.9
	P.R. of China	0.9
	Other ME	1.2
Mercury	Spain	32.7
	USSR	11.3
	Algeria	7.9
	USA	6.8
	Mexico	5.6
	Other CPE	11.0
	Other ME	24.3
Molybdenum	USA	54.4
	Chile	24.9
	CPE	9.2
	Canada	6.6
	Peru	2.3
	Other ME	2.8
Nickel	New Caledonia	25.1
	Canada	14.4
	Cuba	5.7
	Other ME	36.8
	Other CPE	13.5
Phosphate rock	Morocco	25.6
	USA	2.2
	Jordan	0.6
	South Africa	0.4
	Tunisia	0.3
	Israel	0.08
	Togo	0.06
	Senegal	0.04
	Other ME	60.9
Platinum group[f]	South Africa	81.2
	USSR	16.7
	USA	1.4
	Canada	0.8
Potash	Canada	68.7
	CPE	24.8
	West Germany	2.6
	Israel-Jordan[g]	1.5
	USA	1.5
	U.K.	0.3
	Spain	0.3
	France	0.2
	Italy	0.05
	Other ME	1.0

Mineral	Country or Area	Percent Share
Rutile	Brazil	74.4
	Australia	6.9
	India	5.5
	South Africa	4.1
	Italy	3.4
	Sierra Leone	2.1
	CPE	2.1
	USA	1.4
Selenium	Chile	17.4
	Canada	17.4
	USA	16.7
	Peru	5.7
	Zambia	5.7
	Mexico	2.3
	Yugoslavia	1.1
	Finland	0.4
	Sweden	0.4
	Japan	0.4
	Others	33.0
Silver	USA	21.6
	Canada	19.0
	Mexico	12.6
	Peru	7.2
	CPE	23.7
	Other ME	15.9
Sulphur (elemental)	Canada	11.0
	USA	7.7
	Mexico	4.0
	West Germany	1.3
	Spain	1.3
	Italy	0.7
	Japan	0.4
	Near East	17.6
	CPE	11.0
Tantalum	Thailand	33.3
	Australia	20.8
	Nigeria	14.6
	Canada	8.3
	Zaire	8.3
	Brazil	4.2
	Malaysia	4.2
	Other ME	8.3
Tin	Indonesia	15.5
	P.R. of China	15.0
	Malaysia	12.0
	Thailand	12.0
	USSR	10.0
	Bolivia	9.8
	Burma	5.0
	Brazil	4.0
	Australia	3.5
	Nigeria	2.8
	U.K.	2.6
	Zaire	2.0
	USA	0.5
Tungsten	P.R. of China	46.9
	Canada	14.8
	USA	8.6
	USSR	7.3
	Australia	3.8
	Turkey	2.7
	Bolivia	1.4
	Burma	1.1
	Portugal	0.8
	Austria	0.6
	Brazil	0.6
	Thailand	0.6
	Other CPE	3.9
	Other ME	2.8
Vanadium	South Africa	42.2
	USSR	39.2
	P.R. of China	12.7
	Australia	0.2
	Finland	0.07
	USA	0.07
	Other ME	2.7
Zinc	Canada	26.8
	USA	20.0
	Australia	10.0
	Peru	2.9
	Mexico	1.3
	Other ME	30.0
	CPE	10.0
Zirconium	Australia	29.2
	South Africa	25.0
	USA	16.7
	India	6.3
	CPE	12.5
	Other ME	10.4

Source: Bureau of Mines, *Commodity Summaries*, U.S. Department of the Interior, Washington, D.C., 1982. (adapted)

a CPE - centrally planned economies.
b ME - market economies.
c World totals not available; figures are for the known world reserves.
d Total excludes centrally planned economies.
e Recoverable iron.
f Statistics for other market economies are unavailable.
g Includes Dead Sea reserves.
h Statistics for centrally planned economies are not available.

Appendix III World Mineral Production: Percent Share of the Major Producers, by Mineral, 1981 Estimates

Mineral	Country or Area	Percent Share
Aluminum	USA	29.1
	USSR	12.4
	Canada	7.2
	Japan	5.0
	F.R. of Germany	4.7
	Norway	4.2
Antimony	Bolivia	23.7
	South Africa	16.7
	Mexico	4.5
	Yugoslavia	2.8
	USA	1.0
	CPE	28.3
	Other ME	23.1
Asbestos	USSR	42.2
	Canada	22.7
	South Africa	6.0
	Zimbabwe	5.0
	P.R. of China	5.0
	Italy	3.0
Bauxite	Australia	28.4
	Guinea	16.2
	Jamaica	13.9
	USSR	5.3
	Brazil	4.9
	Surinam	4.7
	Yugoslavia	3.6
	Hungary	3.5
	Greece	2.4
	Guyana	2.7
	India	2.0
	USA	1.7
Bismuth	Australia	27.0
	Mexico	21.6
	Peru	16.2
	Japan	9.4
	Canada	5.4
	Republic of Korea	4.0
	CPE	14.3
	USA	n.a.
Cadium	USSR	16.3
	Japan	11.1
	USA	9.0
	Canada	7.3
	F.R. of Germany	6.7
	Belgium	6.0
Chromium	CPE	37.4
	South Africa	34.3
	Philippines	6.1
	Zimbabwe	5.9
	Turkey	4.1
	Finland	1.8
	Other ME	10.4
Cobalt	Zaire	51.0
	CPE	13.6
	Zambia	9.2
	Australia	5.8
	Canada	5.1
	Philippines	5.1
	Finland	4.4
	Morocco	3.4
	Botswana	1.0
	New Caledonia	0.7
Columbium	Brazil	87.0
	Canada	11.4
	Nigeria	1.1
Copper	USA	18.7
	USSR	14.0
	Chile	13.2
	Canada	8.8
	Zambia	7.2
	Zaire	5.8
Gold	South Africa	51.8
	USSR	20.6
	P.R. of China	4.7
	Canada	3.9
	USA	3.2
	Brazil	3.0

Mineral	Country or Area	Percent Share
Gypsum	USA	14.9
	Canada	10.6
	France	8.4
	USSR	8.3
	Spain	7.8
	Iran	4.9
Iron Ore	USSR	28.2
	Brazil	11.5
	Australia	10.5
	USA	8.6
	P.R. of China	8.2
	Canada	5.7
Lead	USSR	16.6
	USA	13.0
	Australia	11.3
	Canada	9.5
	Peru	5.4
	Mexico	4.3
Manganese	USSR	39.9
	South Africa	22.7
	Brazil	7.9
	Australia	7.5
	Gabon	6.2
	India	6.2
Mercury	USSR	32.6
	Spain	17.3
	Algeria	25.8
	USA	14.7
Molybdenum	USA	62.8
	Canada	13.5
	Chile	11.3
	USSR	9.5
	P.R. of China	1.9
	Peru	0.9
Nickel	Canada	22.3
	USSR	20.6
	New Caledonia	10.7
	Australia	10.7
	Indonesia	6.3
	Cuba	5.5
Phosphate	USA	39.8
	CPE	24.4
	Morocco	14.0
Platinum group	USSR	47.7
	South Africa	45.5
	Canada	5.7
	Columbia	0.2
	Australia	0.1
	USA	0.1
Potash	Canada	25.8
	USSR	25.0
	East Germany	12.5
	West Germany	9.6
	USA	7.7
	France	6.9
Rutile	Australia	64.0
	Sierra Leone	15.8
	South Africa	12.3
	Sri Lanka	3.7
	CPE	2.3
	India	1.9
	USA	n.a.
Selenium	Japan	31.7
	Canada	25.4
	USA	19.0
	Mexico	5.7
	Sweden	4.8
Silver	USSR	14.5
	Mexico	14.2
	Peru	11.4
	Canada	11.0
	USA	10.7
	Australia	7.1
Sulphur (elemental)	USA	29.6
	Canada	22.8
	Poland	12.3
	USSR	11.0
	Mexico	6.0
	France	5.5
Tantalum	Brazil	25.5
	Canada	25.5
	Australia	16.3
	Thailand	13.3

Mineral	Country or Area	Percent Share
Tin	Malaysia	25.0
	USSR	14.9
	Thailand	14.1
	Indonesia	12.9
	Bolivia	10.1
	P.R. of China	5.9
	Australia	4.8
	USA	n.a.
Titanium conc. (Ilmenite)	Australia	25.5
	Canada	18.3
	Norway	17.2
	USA	10.5
	USSR	8.4
	South Africa	8.0
Tungsten	P.R. of China	26.0
	USSR	16.9
	Australia	6.3
	USA	6.0
	Bolivia	6.0
	Canada	5.2
	Republic of Korea	5.2
Uranium conc.	USA	30.9
	South Africa	30.6
	P.R. of China	14.0
	Namibia	9.0
	France	6.4
Vanadium	USSR	30.6
	South Africa	30.6
	P.R. of China	14.0
	USA	13.5
	Finland	6.9
Zinc	Canada	18.7
	USSR	17.1
	Peru	8.5
	Australia	7.8
	USA	5.7
	Japan	4.1

Sources: Department of Energy, Mines and Resources, Canada, internal working papers, 1981, Bureau of Mines, *Commodity Summaries*, U.S. Department of the Interior, Washington, D.C., 1982.

Note: n.a. = statistics not available.
a Centrally planned economies.
b Market economies.

Appendix IV Mineral Associations and Study Groups

Producer Associations

COPPER

CIPEC (Conseil Intergouvernemental des Pays Exportateurs de Cuivre)
Founded - June 1967
Members - 1967 - Chile, Peru, Zambia, Zaire
1975 - Indonesia became full member
1975 - Australia and Papua New Guinea became associate members
1976 - Mauritania became associate member
1977 - Yugoslavia became associate member

IRON ORE

APEF (Association des Pays Exportateurs de Fer)
Founded - April 1975
Members - Australia, Algeria, Chile, India, Mauritania, Peru, Sierra Leone, Sweden, Tunisia, Venezuela.

BAUXITE

IBA (International Bauxite Association)
Founded - March 1974
Members - Australia, Guinea, Guyana, Jamaica, Sierra Leone, Haiti, Surinam, Yugoslavia, Ghana, Dominican Republic.

MERCURY

IAMP (International Association of Mercury Producers)
Founded - 1975
Members - Algeria, Italy, Spain, Turkey, Yugoslavia, Peru.

PHOSPHATE ROCK

WPRI (World Phosphate Rock Institute)
Founded - 1973
Members - Algeria, Tunisia, Jordan, Morocco, Syria, Senegal, Togo, and 3 American companies (Agrico, Gardiner Inc., and International Minerals and Chemicals Corp.).

TUNGSTEN

PTA (Primary Tungsten Association)
Members - Australia, Bolivia, Peru, Portugal, Thailand, (China has observer status)

Producer-Consumer Agreements

ITA (International Tin Agreement)
Founded - First agreement, 1956
Sixth agreement, 1982
Members - Exporters (Malaysia, Bolivia, Thailand, Indonesia, Nigeria, Zaire, Australia) plus 22 importers including Canada. The Fifth Agreement marked the first time the USA had joined a producer-consumer agreement. However, the Reagan administration declined to join the Sixth Agreement, as did Bolivia and the USSR.

Study Groups

The Bismuth Institute
Potash Institute of North America
International Potash Institute
International Sulphur Institute
The Uranium Institute
International Lead-Zinc Study Group
U.N. Committee on Tungsten
Cobalt Development Institute

Appendix V Market Share of the Four Leading Market-Economy Exporters [a], by Mineral (1979, unless otherwise specified)

Mineral	Value as a Percent of Total ME Exports	Four Leading ME Exporters
Aluminium	45.9[b]	West Germany, USA, Canada, Norway
Aluminium ores, alumina	73.1[c]	Australia, Jamaica, Surinam, USA
Aluminum ore, concentrate	75.6[c,d]	Guinea, Jamaica, Australia, Guyana
Asbestos crude, simply worked	91.4	Canada, South Africa, Zimbabwe, West Germany
Chromium ore, concentrate	72.4[c]	South Africa, Turkey, Philippines, India
Copper excluding cement copper	48.9[c]	Chile, Belgium/Luxembourg, West Germany, Zambia
Copper ores, excluding matte	73.3[c,e]	Philippines, Papua New Guinea, Canada, Chile
Copper refined, unwrought	63.9[f]	Chile, Zambia, Belgium/ Luxembourg, Canada
Copper, waste and scrap	61.2[b]	USA, France, U.K., Netherlands
Iron ore, concentrate	69.5	Brazil, Australia, Canada, India
Lead	58.9[b]	Australia, U.K., West Germany, Belgium/Luxembourg
Manganese ore, concentrate	74.3[c]	South Africa, Gabon, Brazil, Australia
Nickel	60.1[b]	Canada, USA, U.K., Norway
Nickel ores, concentrate	75.2[c]	Canada, Australia, South Africa, Indonesia
Natural calcium, phosphates, etc.	79.2[c]	Morocco, USA, Togo, Nauru
Phosphates, unground	100.0[g]	Morocco
Platinum group metals	82.3[c]	South Africa, U.K., Switzerland, USA

Mineral	Value as a Percent of Total MR Exports	Four Leading MR Exporters
Silver, platinum	50.3[c]	U.K., Switzerland, USA, Mexico
Silver, unworked, partly worked	45.8[c]	U.K., Canada, Switzerland, Mexico
Tin	71.9	Malaysia, Thailand, Indonesia, Bolivia
Tungsten ore, concentrate	55.9[c]	Australia, Malaysia, Canada, Bolivia
Zinc ores, concentrates	62.8[c]	Canada, Peru, Australia, Ireland
Zinc	56.0[b]	Canada, Belgium/Luxembourg, Australia, Netherlands

Source: United Nations, *Yearbook of International Trade Statistics*, 1980.

a Centrally planned economies are not included.
b 1980
c Estimate.
d 1976
e 1977
f 1978

Appendix VI Ocean Mining Companies and Corporate Participation

Ocean Management Inc.

25% - Inco (the leader) (Canada-USA)
25% - AMR (West Germany) - Metallgesellschaft A.G.
- Preussag A.G.
- Deutsche Schachtbau
- Tifbohrgesellschaft M.B.H.

25% - DOMCO (represents 24 Japanese companies including the Sumitomo Group)
25% - Sedco Inc. (an American ocean engineering company)

Ocean Minerals Co.

- Lockheed Missile and Space Corp. (the leader) (USA)
- Amoco Minerals Co. (Standard Oil of Indiana) (USA)
- Billiton B.V. (a subsidiary of Royal Dutch Shell, Netherlands)
- BKW Ocean Minerals B.V. (Netherlands)

Ocean Mining Associates

33.3% - U.S. Steel Corp. (USA)
33.3% - Union Minière S.A. (Belgium)
33.3% - Sun Ocean Ventures (USA)

Kennecott Joint Venture

50% - Kennecott Copper Corp. (USA)
10% - Noranda Mines Ltd. (Canada)
10% - Mitsubishi Corp. (Japan)
10% - Rio Tinto Zinc Corp. (U.K.)
10% - Consolidated Gold Fields (U.K.-South Africa)
10% - British Petroleum Co. (U.K.)

AFERNOD – Association Française pour l'Étude et la Recherche des Nodules

- Centre National pour l'Exploitation des Océans
- Commissariat à l'Énergie Atomique
- Société Le Nickel
- Chantiers de France
- Bureau de Recherches Géologiques et Minières

DOMA – Deep Ocean Mining Association (34 Japanese companies)

Eurocean – a consortium of French, Swedish and Netherlands companies

Soviet Union – Thus far the USSR's efforts have been largely academic though professional. It could develop the necessary technology.

Appendix VII Value of Mineral Production in Canada, by Mineral, 1982

Metallic Minerals	Value of Production ($ thousand)	Value as Percent of Total Metallic Plus Nonmetallic
Antimony	4,172	.04
Bismuth	762	.008
Cadmium	2,235	.02
Cobalt	45,379	.49
Columbium (Cb_2O_3)	20,944	.23
Copper	1,179,767	12.84
Gold	929,378	10.11
Iron ore	1,211,657	13.18
Iron remelt	105,872	1.15
Lead	210,203	2.29
Molybdenum	327,077	3.56
Nickel	581,074	6.32
Platinum group	98,889	1.08
Selenium	3,752	.04
Silver	378,761	4.12
Tantalum (Ta_2O_5)	7,947	.09
Tellurium	723	.008
Tin	2,750	.03
Tungsten (WO_3)	n.a.	n.a.
Uranium (U)	815,185	8.87
Zinc	1,108,687	12.06
Total Metallic	$ 7,035,214	76.54

Nonmetallic Minerals	Value of Production ($ thousand)	Value of Percent of Total Metallic Plus Nonmetallic
Asbestos	402,995	4.38
Barite	2,359	.02
Gemstones	186	.002
Gypsum	42,577	.46
Magnesitic dolomite, brucite	13,556	.15
Nepheline syenite	17,338	.19
Peat	54,399	.59
Potash (K_2O)	625,658	6.81
Pryrite, pyrrhotite	220	.002
Quartz	32,880	.36
Salt	161,452	1.76
Soapstone, talc, pyrophyllite	5,456	.06
Sodium sulphate	47,592	.52
Sulphur, in smelter gas	41,027	.45
Sulphur, elemental	600,302	6.54
Titanium dioxide	106,006	1.15
Total nonmetallic	$ 2,154,003	23.44
Total metallic and nonmetallic	$ 9,189,217[a]	99.98[b]

Source: Energy, Mines and Resources Canada, *Canadian Mineral Survey 1982.*

Note: n.a. = not available.

a Value of total metallic plus nonmetallic mineral production in 1982 represents 27 percent of total mineral production for the year. The total, over $33 billion, includes fossil fuels and structural materials.

b Not exactly equal to 100 because of rounding error.

Notes

1. L.R. Stewart, 'Canada's Role in the International Uranium Cartel' *International Organization*, vol. 35, number 4, Autumn 1981.
2. L. Mumford, *Technics and Civilization*, (New York: Harcourt, Brace and World Inc., 1963); J.F. McDivitt, *Minerals and Men*, (Baltimore: The Johns Hopkins Press, 1965); D. Landes, *The Unbound Prometheus*, (London: Cambridge University Press, 1969); M.P. Romney, 'Minerals in the Life of Man', *Mining Congress Journal*, July 1965.
3. J.F. McDivitt, *Minerals and Men*, p. 6.
4. O.T. Mouzon, *International Resources and National Policy*, (New York: Harper and Bros., 1959) p. 415.
5. J.P. Drolet, *Canadian Mineral Policy in an Interdependent World*, (Ottawa: Department of Energy, Mines and Resources, 1974), introduction.
6. For a more detailed discussion of the interplay of these goals, see P.J. Caragata, 'Non-Fuel Minerals and Canadian Foreign Policy: Negotiations from Strength and Weakness', University of Toronto; Unpublished Ph.D. Thesis, 1981, pp. 39-84.
7. B.W. Mackenzie, *Nickel: Canada and the World*, (Ottawa: Information Canada, 1968) Mineral Report 16, Department of Energy, Mines and Resources, p. 63.
8. M. Tanzer, *The Political Economy of International Oil and the Underdeveloped Countries*, (Boston: Beacon Press, 1969) p. 320.
9. J.W.F. Rowe, *Primary Commodities in International Trade*, (Cambridge, England: Cambridge University Press, 1965) p. 136.
10. Z. Mikdashi, 'Influencing the Environment for Primary Commodities', *Journal of World Trade Law*, vol. 8, no. 2, March/April 1974, p. 158.
11. M. Tanzer, *The Political Economy of International Oil and the Underdeveloped Countries*, p. 321.
12. J.D. Toucher, *Patterns and Trends in Agreements with Foreign Countries*, International Minerals Acquisition and Operations Institute, (Boulder, Co.: Rocky Mountain Mineral Law Foundation, University of Colorado, 1974) p. 11; H. O'Connor, *World Crisis in Oil*, (London: Elek Books, 1962) p. 331.
13. U.N. General Assembly Resolution no. 1803:xvii on permanent sovereignty over natural resources, adopted December 14, 1962. The assertion of sovereignty was reiterated in a *Charter of Economic Rights and Duties of States*, endorsed by the U.N. General Assembly's 29th regular session in December 1974.
14. T.H. Moran, *Multinational Corporations and the Politics of Dependence: Copper in Chile*, (Princeton, N.J.: Princeton University Press, 1974) p. 6; N. Girvan, 'Multinational Corporations and Dependent Underdevelopment in Mineral Export Economies', *Social and Economic Studies*, vol. 19, no. 4, December 1970, p. 480; C. Harvey, 'Growth and Structure of the Economy', in M. Bostock and C. Harvey, (eds.), *Economic Independence and Zambian Copper: A Case Study of Foreign Investment*, (New York: Praeger, 1972), p. 100.
15. R. Gilpin, 'The Politics of Transnational Economic Relations', in Keohane, R.O., and Nye, J.S., (eds.), *Transnational Relations and World Politics*, (Cambridge, Mass.: Harvard University Press, 1972) p. 57.

16. D. Acheson, *Present at the Creation*, (New York: Signet, 1969) p. 56; the Smoot-Hawley tariff act raised U.S. tariffs to their highest level in history.
17. R. Gilpin, 'The Politics of Transnational Economic Relations' pp. 61-62.
18. *Wall Street Journal*, 15 April 1981, p. 22.
19. China is dependent on imports for roughly half its consumption of aluminum, copper, lead and zinc and for almost all its nickel; P. Connolly, and R. Perlman, *The Politics of Scarcity: Resource Conflicts in International Relations*, (London: Oxford University Press, 1975) p. 121.
20. IIASA (International Economic Studies Institute), *Raw Materials and Foreign Policy* (Washington, D.C., 1976) p. 5.
21. *Ibid.*, p. 10.
22. M. Tanzer, *The Political Economy of International Oil and the Underdeveloped Countries*, p. 416.
23. IIASA, *Raw Materials and Foreign Policy*, pp. 25-26.
24. OPEC, *Topics*, vol. 9, no. 1, March/April 1980.
25. C.F. Bergsten *et al.*, 'U.S. Commodity Policy: The Integration of Domestic and International Requirements', remarks by the Assistant Secretary of the Treasury for International Affairs, before the Financial Conference of the American Mining Congress, the Arizona Biltmore Hotel, Phoenix, Arizona, 1978, p. 417.
26. A. Hirschman, *How to Divest in Latin America*, Princeton, N.J., Essays in International Finance, no. 76, November 1969.
27. A.A. Jordon, and R.A. Kilmarx, *Strategic Mineral Dependence: The Stockpile Dilemma*, The Washington Papers, vol. vii, no. 70, (Beverly Hills and London: Sage Publications, 1979) p. 32.
28. P. Connolly, and R. Perlman, *The Politics of Scarcity: Resource Conflicts in International Relations*, p. 97.
29. *Northern Miner*, August 11, 1977.
30. P. Connolly, and R. Perlman, *The Politics of Scarcity: Resource Conflicts in International Relations*, p. 83.
31. C.E. Beigie, *et al.*, *Seeking a New Accommodation in World Commodity Markets*, (New York: The Trilateral Commission, 1976), pp. 13-14.
32. C.J. Johnson, 'Cartels in Minerals and Metals Supply', *Mining Congress Journal*, vol. 62, no. 1, January 1976, pp. 30-31.
33. *Forbes*, 1 March 1977.
34. *New York Times*, 9 November 1975.
35. *New York Times*, 23 February 1975.
36. P. Crowson, *Non-Fuel Minerals and Foreign Policy*, (London: Royal Institute of International Affairs, 1977), pp. 10-11.
37. R.A. Perlman, *The Outlook for Commodities: When Will the Next Boom Happen?* (London: Commodities Research Unit, July 1976) p. 10.
38. *Globe and Mail*, 2 July 1976.
39. R.A. Perlman, *The Outlook for Commodities: When Will the Next Boom Happen?* p. 11.
40. *Forbes*, 1 March 1977; 1 flask = 76 pounds.
41. Bureau of Mines, 1982, *Mineral Commodity Summaries*, (Washington, D.C.: U.S. Department of the Interior, 1982), pp. 96-97.
42. *Northern Miner*, 21 February 1980. Canada's one operating mine closed in 1979.
43. *Forbes*, 1 March 1977, p. 31.
44. R.S. Pindyck, 'Cartel Pricing and the Structure of the World Bauxite Market', *The Bell Journal of Economics*, vol. 8, no. 2, 1977, p. 345.
45. *Ibid.*, p. 356, estimates that the price of bauxite would fall $3 or $4 per short ton if Australia were to leave the IBA.
46. *Globe and Mail*, 6 June 1979.
47. A.A. Jordan, and R.A. Kilmarx, *Strategic Mineral Dependence: The Stockpile Dilemma*,

p. 70. One-third of world bauxite production is controlled by exporting country governments and two-thirds by eight MNCs; R.F. Mikesell, *New Patterns of World Mineral Development*, (Washington, D.C.: British-North America Committee, 1979), p. 19.

48. N. Girvan, *Foreign Capital and Economic Underdevelopment in Jamaica*, (Surrey, England: Unwin Bros., 1971), p. 80.
49. P. Connolly, and R. Perlman, *The Politics of Scarcity: Resource Conflicts in International Relations*, p. 86 (about 35 percent of the cost).
50. H.H. Landsberg, 'Energy and Minerals: How They Differ in the International Context', *Engineering and Mining Journal*, October, vol. 177, no. 10, 1976, p. 65.
51. C.F. Bergsten *et al.*, 'U.S. Commodity Policy: The Integration of Domestic and International Requirements', p. 153.
52. *Ibid.*, p. 153; and *Forbes*, 1 March 1977, p. 32.
53. R.S. Pindyck, 'Cartel Pricing and the Structure of the World Bauxite Market'. A U.S. Department of Labour Study predicts $40 per short ton (C.J. Johnson, 'Cartels in Minerals and Metal Supply', p. 31). A major reason for the higher cost of the substitutes is that they are more energy intensive than bauxite.
54. *Northern Miner*, 7 December 1978.
55. C.F. Bergsten *et al.*, 'U.S. Commodity Policy: The Integration of Domestic and International Requirements', p. 153.
56. *Forbes*, 1 March 1977, p. 32; *Globe and Mail*, 6 October 1979.
57. *Financial Post*, 16 February 1980.
58. *Globe and Mail*, 2 August 1979.
59. *Globe and Mail*, 16 October 1979.
60. See for example: BMR, *Basic Data for Estimating U.S. Mineral Requirements and Availability*, Washington, D.C., February 1976, p. 30; S. Harris, M. Solmon, and B. Smith, *Analysis of Commodity Markets for Policy Purposes*, Thames Essay No. 17, (London: Trade Policy Centre, 1978); P. Crowson, *Non-Fuel Minerals and Foreign Policy*, p. 3; C.J. Johnson, 'Cartels in Minerals and Metal Supply', p. 31.
61. R.S. Pindyck, 'Cartel Pricing and the Structure of the World Bauxite Market', p. 356. Presumably he means corporate profits of the foreign-owned companies in Australia; perhaps he means the government could double its tax revenue.
62. A. Cordell, 'Resources: Implications of Ownership', in *Essays on Aspects of Resource Policy*, Special Study No. 27, (Ottawa: Science Council of Canada, 1973), p. 10.
63. H. Fargey, Cominco's Submission to the Canadian Group of the Trilateral Commission's Seminar on *A Canadian Perspective on Commodities*, Winnipeg, 1977, (mimeo), p. 4.
64. J.R. Behrman, *International Commodity Agreement: an Evaluation of the* UNCTAD *Integrated Commodity Programme*, (Washington, D.C.: Overseas Development Council, 1977), pp. 3 and 15; K.A. Mingst, 'Economic Determinants of International Commodity Regulations', *Journal of World Trade Law*, vol. 13, no. 2, March-April 1979, p. 163.
65. J.R. Behrman, *International Commodity Agreement: an Evaluation of the* UNCTAD *Integrated Commodity Programme*, p. 19.
66. J.W.F. Rowe, *Primary Commodities in International Trade*, p. 184.
67. *Ibid.*, p. 187.
68. Prior to that, the responsibility for coordinating ICA discussions fell to other U.N. bodies: the Commission on International Commodity Trade and the U.N. Interim Coordinating Committee on International Commodity Agreements.
69. Department of External Affairs, Communiqué, 15 January 1981.
70. M. Radetzki, *Changing Structure in the Financing of the Minerals Industry in the* LDCs, (Stockholm: Institute for International Economic Studies, University of Stockholm, 1980) pp. 1-2; Canada, Energy, Mines and Resources, *Mineral Policy: A Discussion Paper*, Ottawa, 1982, p. 9.

71. Main minerals produced in Newfoundland are iron ore (3 mines), asbestos, copper-zinc, gypsum, and lead-zinc (1 mine each).
72. B.C. has 8 copper mines, 4 copper-molybdenum mines, and 5 lead-zinc mines, among others. New Brunswick has 7 coal mines, 1 copper-zinc mine, 5 gypsum mines, 5 silica mines and 3 limestone quarries, among others.
73. A.R. Ritter, *Conflict and Coincidence of Canadian and Less Developed Country Interests in International Trade in Primary Commodities*, Discussion Paper No. 109, (Ottawa: Economic Council of Canada, 1978), p. 50 (takes into consideration Canada's exports of commodities and manufactured goods).
74. J.R. Behrman, *International Commodity Agreement: An Evaluation of the* UNCTAD *Integrated Commodity Programme*, p. 49 and pp. 55-57.
75. However, in a comparison of price trends for copper, nickel, bauxite, lead, zinc, tin, and iron ores and metal, for the period 1960-76 (first quarter), we find that copper (ores and metal) shows the greatest tendency to fall below a 1970 export price index of 100 and to fall the farthest below 100 (Ritter, 1978). Thus, strictly in terms of the problem of price stability, copper seems to merit priority for an international commodity agreement. Nevertheless, it appears that copper and zinc, both freely traded throughout the world without benefit of international agreement or buffer stock, have exhibited a much more restrained degree of total price escalation, and consistently less drastic price fluctuation than has tin (which is covered by an ICA). J.J. Ferrigan, Statements on Behalf of the American Iron and Steel Institute Before the Trade Policy Staff Committee, Office of the U.S. Trade Representative, April 10, 1980, Washington, D.C., p. 3.
76. J.E. Tilton, *The Future of Non-Fuel Minerals*, (Washington, D.C.: The Brookings Institution, 1977), pp. 65-71; K. Hemmie, *et al.*, *Trade in Primary Commodities: Conflict of Cooperation?*, a tripartite report, (Washington, D.C.: The Brookings Institution, 1974) pp. 29-30.
77. C.E. Beigie, *et al.*, *Seeking a New Accommodation in World Commodity Markets*, p. 5.
78. *Ibid.*, p. 12.
79. A.R. Ritter, *Conflict and Coincidence of Canadian and Less Developed Country Interests in International Trade in Primary Commodities*, p. 111.
80. M.J. Lord, 'The Impact of International Price Stabilization Schemes on Primary Producing Countries', Washington, D.C.: Inter-American Development Bank (mimeo, a draft copy), 1980, p. 3. This conclusion is based on several strict (stated or implied) assumptions from 'traditional economics' which may not necessarily obtain:

    i linear supply and demand curves;
    ii additive random disturbances;
    iii a single competitive market;
    iv perfect information on future markets;
    v no risk aversion by market participants.

    What is needed is empirical analysis. For helpful critiques which argue for greater clarity in the debate over the *projected* consequences of price stabilization see Harris, Schwarz, Smith, *Analysis of Commodity Markets for Policy Purposes*, pp. 40-41; and D.T. Nguyen, 1980, 'The Effects of Partial Price Stabilization on Export Instability and Level: Implications for the North-South Negotiations', in A. Sengupta, (ed.), *Commodities Finance and Trade: Issues in North-South Negotiations*, (London: Frances Pinter (Publications) Ltd., 1980) pp. 126-129.
81. In the case of bauxite, the source of instability may vary: for Guyanese bauxite, the discussions are created by changes in both supply and demand; but for bauxite from Jamaica and Haiti, the problem is on the supply side. See M.J. Lord, 'The Impact of International Price Stabilization Schemes on Primary Producing Countries', p. 9.
82. *Ibid.*, p. 3.
83. C.F. Bergsten *et al.*, *'U.S. Commodity Policy: The Integration of Domestic and International Requirements', p. 14.*

84. *Ibid.*, p. 23.
85. Based on U.S. Treasury Department internal working documents, 1982.
86. mm, *Raw Materials and Foreign Policy*, p. 304.
87. ostp (Office of Industrial and Strategic Materials), *Non-Fuel Minerals Policy Review: Availability of Foreign Minerals to the United States and its Allies*, (Washington, D.C.: Bureau of Economic and Business Affairs, U.S. Department of State, 1980), working paper, p. 36.
88. C.F. Bergsten *et al.*, 'U.S. Commodity Policy: The Integration of Domestic and International Requirements', p. 397.
89. *The Economist*, 19 April 1980.
90. J.E. Tilton, *The Future of Non-Fuel Minerals*, p. 70.
91. R.F. Mikesell, *The World Copper Industry: Structure and Economic Analysis*, (Baltimore and London: John Hopkins University Press for Resources for the Future, 1979) p. 190; C.F. Bergsten *et al.*, 'U.S. Commodity Policy: The Integration of Domestic and International Requirements', p. 3.
92. Quoted in W.E. Haviland, *International Commodity Agreement*, Montreal: Canadian Trade Committee, Private Planning Association, July 1963, p. 6.
93. A.R. Riner, *Conflict and Coincidence of Canadian and Less Developed Country Interests in International Trade in Primary Commodities*, p. 116. See also D.M.G. Newbery and J.E. Stiglitz, *The Theory of Commodity Price Stabilization: A Study in the Economics of Risk*, (New York: Oxford University Press, 1981) p. 26.
94. M.J. Lord, 'The Impact of International Price Stabilization Schemes on Primary Producing Countries', p. 2; D.M.G. Newbery and J.E. Stiglitz, *The Theory of Commodity Price Stabilization: A Study in the Economics of Risk*, p. 299.
95. J.R. Behrman, *International Commodity Agreement: An Evaluation of the UNCTAD Integrated Commodity Programme*, p. 7.
96. mm, *Raw Materials and Foreign Policy*, p. 310.
97. R.F. Mikesell, *The World Copper Industry: Structure and Economic Analysis*, p. 190; mm, *Raw Materials and Foreign Policy*, p. 310.
98. K. Hamaide *et al.*, *Trade in Primary Commodities: Conflict of Cooperation?* p. 37.
99. D.M.G. Newbery and J.E. Stiglitz, *The Theory of Commodity Price Stabilization: A Study in the Economics of Risk*, pp. 298-299.
100. J.R. Behrman, *International Commodity Agreement: An Evaluation of the UNCTAD Integrated Commodity Programme*, p. 23; C.F. Bergsten *et al.*, 'U.S. Commodity Policy: The Integration of Domestic and International Requirements', p. 4.
101. This may change in the future. A new rubber agreement was concluded 6 October 1979 (effective 1 October 1980). It marked the first time that consuming countries committed themselves to *equal* financing of direct contributions to a buffer stock. It also marked the first time that a price range has been so closely linked to market trends, while at the same time including a provision for automatic price revision. UNCTAD, *Monthly Bulletin*, No. 157, December 1979.
102. Unless otherwise cited, the sources here are C.F. Bergsten *et al.*, 'U.S. Commodity Policy: The Integration of Domestic and International Requirements', pp. 10-12 and 15; and J.R. Behrman, *International Commodity Agreement: An Evaluation of the UNCTAD Integrated Commodity Programme*, p. 22, which draws upon the work of Smith and Shlak, *Economic Journal*, December 1976.
103. K. Barkman, 'The International Tin Agreements', *Journal of World Trade Law*, vol. 9, September-October 1975, p. 503; S.D. Stevens, Statement on Behalf of the American Mining Congress Before the Trade Policy Staff Committee, Office of the U.S. Trade Representatives, 11 April 1980, Washington, D.C., pp. 4-5; J.J. Ferrigan, Statements on Behalf of the American Iron and Steel Institute Before the Trade Policy Staff Committee, Office of the U.S. Trade Representatives, pp. 2-3; *The Economist*, 26 June 1982.

104. April 1975 to June 1976, and also in 1973; J.J. Ferrigan, Statements on Behalf of the American Iron and Steel Institute Before the Trade Policy Staff Committee, Office of the U.S. Trade Representatives, p. 5.
105. C.F. Bergsten *et al.*, 'U.S. Commodity Policy: The Integration of Domestic and International Requirements', p. 5.
106. *The Economist*, 26 June 1982.
107. See for example, Bureau of Mines, *Minerals Commodity Summaries*, (Washington, D.C.: U.S. Department of the Interior, 1979); and Bureau of Mines, *Minerals Yearbook: 1975, vol. iii, Area Reports: International*, (Washington, D.C.: U.S. Department of the Interior, 1978).
108. D.R. Derry, C.E. Michener, and J.K.B. Booth, 'World Mining Exploration Trends: Politics of Prospecting', March 1974, *World Mining*, p. 47.
109. This latter reason is particularly true now that banks, which have a shorter time horizon (6-10 years) than the MNCs (20-25 years), are engaged in financing mining projects. Banks tend to insist on supporting projects on the up phase of a price cycle. M. Radetzki, *Changing Structures in the Financing of the Minerals Industry in the LDC*, p. 9.
110. BNAC (British North American Committee), *Mineral Development in the Eighties: Prospects and Problems*, Montreal; C.D. Howe Research Institute, 1976, p. 14; N. Clewiler, and P.R. Richardson, 'Changing Mineral Markets: Some Implications for Canada', in *International Competition and the Canadian Mineral Industries*, Proceedings No. 2 (Kingston: Centre for Resource Studies, 1978) p. 84.
111. R.F. Mikesell, *New Patterns of World Mineral Development*, p. 20.
112. J.E. Tilton, *The Future of Non-Fuel Minerals*, p. 63.
113. *Financial Post*, 14 April 1979.
114. R.F. Mikesell, *New Patterns of World Mineral Development*, p. 25.
115. *Globe and Mail*, 5 October 1979.
116. R.F. Mikesell, *New Patterns of World Mineral Development*, p. 25; UNCINRET (United Nations Centre for National Resources, Energy and Transport), 'Exploration for Natural Resources in Developing Countries: Financial Requirements and Institutional Mechanisms', Background paper for the Intergovernmental Group of Experts on Mineral and Energy Exploration, 7 March 1978, New York; UNCINRET, 'Multilateral Development Assistance for the Exploration of Natural Resources', Report of the Intergovernmental Group of Experts on Mineral and Energy Exploration in Developing Countries, August 1978, New York, (final draft).
117. A.A. Jordan and R.A. Kilmarx, *Strategic Mineral Dependence: The Stockpile Dilemma*, p. 30.
118. R.F. Mikesell, *New Patterns of World Mineral Development*, p. 14.
119. A.A. Jordan and J.A. Kilmarx, *Strategic Mineral Dependence: The Stockpile Dilemma*, p. 34.
120. UNCINRET, 'Exploration for Natural Resources in Developing Countries: Financial Requirements and Institutional Mechanisms', pp. 56-57.
121. J. Carman, 'United Nations Mineral Exploration Activity: 1960-1976', *Natural Resources Forum*, July 1977, pp. 320-1.
122. CIMM, *Non-Fuel Minerals Policy Review: Availability of Foreign Minerals to the United States and its Allies*, p. 28.
123. R.F. Mikesell, *New Patterns of World Mineral Development*, p. 14.
124. CIMM, *Non-Fuel Minerals Policy Review: Availability of Foreign Minerals to the United States and its Allies*, p. 27.
125. R.F. Mikesell, *New Patterns of World Mineral Development*, p. 14.
126. UNCINRET, 'Multilateral Development Assistance for the Exploration of Natural Resources'.
127. R.F. Mikesell, *New Patterns of World Mineral Development*, pp. 14, 21, 17.

128. R.F. Mikesell, *New Patterns of World Mineral Development*, p. 14; See also M. Radetzki, *Changing Structures in the Financing of the Minerals Industry in the LDC*.
129. S.D. Strauss, Statement on Behalf of the American Mining Congress Before the Trade Policy Staff Committee, Office of the U.S. Trade Representative, p. 6.
130. cmm, *Non-Fuel Minerals Policy Review: Availability of Foreign Minerals to the United States and its Allies*, p. 29; R.F. Mikesell, *New Patterns of World Mineral Development*, p. 9.
131. Engineering and Mining Journal, *E&MJ International Directory of Mining*. (New York: McGraw-Hill, 1981).
132. *Mining Journal*, vol. 289, no. 7406, 29 July 1977.
133. *Northern Miner*, 24 November 1977.
134. mm, *Raw Materials and Foreign Policy*, pp. 177-178.
135. mm, *Raw Materials and Foreign Policy*, pp. 35-36.
136. W.R. Skinner, *Mining International Yearbook*, (London: Financial Times, 1975).
137. *Mining Journal*, vol. 290, no. 7433, 3 February 1978. The section on U.K. stockpiling activity, to follow later, provides another reason for the lack of government activity; P. Crowson, *Non-Fuel Minerals and Foreign Policy*, pp. ii, 5-6, 11-12.
138. An interview with a Metallgesellschaft executive in Toronto; the insurance covers '95 percent of the direct capital investment'. See also W.G. Chambers, and J. Reid, 'Canadian Resource Management and the North-South Dialogue', in *Canada's Minerals Trade, the Balance of Payments and Economic Development*, Proceedings No. 4, November, 1978, Kingston: Centre for Resource Studies, p. 85; mm, *Raw Materials and Foreign Policy*, p. 37.
139. The Ministry of Economic Development, *Directives Concerning the Allowance of Subsidies for Improving West Germany's Access to Mineral Resources and Natural Gas*, Bonn, 23 August 1975.
140. *Financial Times*, London (quoted in the *Globe and Mail*, 27 August 1979; *Financial Post*, 14 April 1979.
141. *World Mining*, October, 1980.
142. Japanese Delegation, 'Outline of Japanese Mining Policy and Statistics (metal, coal and petroleum)', September 21-27, 1976, Bangkok, submission for the Third Session of the Committee on Natural Resources (mimeo), p. 4.
143. Japanese Delegation, 'Outline of Japanese Mining Policy and Statistics', pp. 4, 6.
144. *Northern Miner*, November 24, 1977; M.A. Galway, *Japanese Involvement in British Columbia Copper*, MR 145, (Ottawa: Department of Energy, Mines and Resources, 1975) pp. 9-12.
145. mm, *Raw Materials and Foreign Policy*, p. 36.
146. W.G. Chambers, J. Reid, and S.G. Harris, *Canadian Minerals and International Economic Interdependence*, MR 162, (Ottawa: Energy, Mines and Resources, 1977) p. 32.
147. M.A. Galway, *Japanese Involvement in British Columbia Copper*, p. 14.
148. *Northern Miner*, 24 November 1977; mm, *Raw Materials and Foreign Policy*, p. 281; S. Harris, *Analysis of Commodity Markets for Policy Purposes*, p. 258.
149. N.D. Clowdus and P.R. Richardson, (eds.), *Rate-of-Return Taxation of Minerals*, (Kingston: Centre for Resource Studies, 1977) p. 94.
150. cmm, *Non-Fuel Minerals Policy Review: Availability of Foreign Minerals to the United States and its Allies*, p. 30.
151. *Northern Miner*, 24 November 1977; ovic (Overseas Private Investment Corporation), 1974, *Annual Report*, for 1973, Washington, D.C., p. 8; ovic, *Annual Report*, for 1974, Washington, D.C., pp. 7-9; ovic, 1979, *Annual Report*, for 1978, Washington, D.C., pp. 14, 4, 15-16; cmm, *Non-Fuel Minerals Policy Review: Availability of Foreign Minerals to the United States and its Allies*, p. 31.
152. cmm, *Non-Fuel Minerals Policy Review: Availability of Foreign Minerals to the United States and its Allies*, p. 31.

153. *Globe and Mail*, 27 August 1979.
154. R. Stein, and I. Walter, 'Seabed Resources and International Law', *Resources Policy*, vol. 3, no. 4, December 1977.
155. Nevertheless, 'it will literally take hundreds of thousands of years for the deposits to be formed again...' J.P. Drolet, 'Minerals of the Law of the Sea', address to the Metallurgical Engineering Graduate Students' Society, McGill University, 23 March 1979, Montreal, Canadian Institute of Mining and Metallurgy, p. 21.
156. *Northern Miner*, 12 September 1974; *Globe and Mail*, 20 September 1978.
157. D.W. Pasho, 'Ocean Mining', Internal Report, Ottawa: Energy, Mines and Resources, 1979. Pilot projects for smelting the nodules have not been able to recover sufficient quantities of ore to repay investment (*Mining Magazine*, September 1979).
158. *Northern Miner*, 22 July 1976; 14 April 1977; 27 April 1978.
159. *The Economist*, 31 May 1980.
160. *Globe and Mail*, 20 September 1978.
161. *Northern Miner*, 14 April 1977; *Globe and Mail*, 5 April 1979; 7 September 1979.
162. *Northern Miner*, 31 May 1979. Instability in Zambia was due largely to a spillover of the war in Rhodesia. Production disruption continues to some extent due to technical problems; Northern Miner, 26 July 1979. See also Department of Energy, Mines and Resources, *Mineral Policy: A Discussion Paper*, p. 23.
163. R.H. Fischer, W.E. Carwood, H. Heinemann, *Non-Hydrogenative Demetalation of Residue Using Manganese Nodules*, (Paulsboro, New Jersey: Mobil Research and Development Corporation, 1975), p. 776.
164. J.M. Murphy, 'Deepsea Mining Legislation Viewed as Urgent', March 1976, *Mining Congress Journal*, vol. 62, no. 3; R. Stein, and I. Walter, 'Seabed Resources and International Law', *Resources Policy*, vol. 3, no. 4, December 1977.
165. *Mining Journal*, vol. 290, no. 7441, 31 March 1978.
166. Geoffrey Stevens, *Globe and Mail*, 23 November 1977.
167. Sources for the remaining discussion on ocean mining are: *Northern Miner*, 14 April 1977; 25 August 1977; 24 November 1977; Globe and Mail, 8 September 1977; 9 September 1977; 23 November 1977; 18 May 1978; 26 August 1978; *Financial Post*, 20 May 1978; 28 July 1979; *New York Times*, 27 November 1977; *Washington Post*, 22 August 1978; *Mining Journal*, vol. 290, no. 7451, 9 June 1978.
168. Mineral Resources Branch, *The Future of Nickel and the Law of the Sea*. Mineral Policy Background Paper No. 10, (Toronto: Ontario Ministry of Natural Resources, 1980), p. iv.
169. J.P. Drolet, 'Minerals and the Law of the Sea', p. 47.
170. *New York Times*, 19 December 1976; 17 January 1977; *Globe and Mail*, 19 February 1979.
171. An International Monetary Fund scheme (Compensatory Financing Facility), not discussed here, made loans totalling $4.5 billion (U.S.) between 1975 and 1980. This represents close to 33 percent of the total credits made available by the IMF for all accounts.
172. *The Economist*, 30 June 1979; 4 August 1979; 27 October 1979; 11 December 1982.
173. C.J. Cajka, 'The Global Approach to Mineral Problems: A Scramble for Market Share', April 1978, Ottawa: Department of Energy, Mines and Resources, (mimeo), p. 13.
174. H.C. Armstrong, 'The Nature of the Problem', in *International Competition and the Canadian Mineral Industries*, 1978, p. 13; W.G. Chambers, J. Reid, and S.G. Harris, *Canadian Minerals and International Economic Interdependence*, MR 162, (Ottawa: Department of Energy, Mines and Resources, 1977), p. 13.
175. Federal Government Contribution, Canadian Group of the Trilateral Commission's Seminar on a *Canadian Perspective on Commodities*, Winnipeg, 1977, (mimeo), p. 18.
176. Based on interviews with Canadian government officials in Ottawa.
177. E.A. McDermott, 'An Open Letter on Stockpiling', *Mining Congress Journal*, June 1963, p. 39.

178. J.E. Tilton, *The Future of Non-Fuel Minerals*, p. 95; A.A. Jordan, and R.A. Kilmarx, *Strategic Mineral Dependence: The Stockpile Dilemma*, pp. 42, 55, 58.
179. *Northern Miner*, 16 March 1978.
180. Quoted in A.A. Jordan, and R.A. Kilmarx, *Strategic Mineral Dependence: The Stockpile Dilemma*, p. 46.
181. IIIS, *Raw Materials and Foreign Policy*, p. 261; FEMA (Federal Emergency Management Agency), *Stockpile Report to the Congress*, Washington, D.C., 1982, p. v.
182. H.C. Armstrong, 'The United States Market for Canadian Minerals', *CIM Bulletin*, March 1971, vol. 64, no. 707, p. 157.
183. T.P. Mahida *et al.*, *Towards a Nickel Policy for the Province of Ontario*, Mineral Policy Background Paper No. 4, (Toronto: Ontario Ministry of Natural Resources, December 1977), pp. 54-5.
184. AMC (American Mining Congress), 'The Stockpile Story', *Mining Congress Journal*, March 1963, p. 47; K.S. Rachamalla, and D.H. Bell, *Towards a Zinc Policy for the Province of Ontario*, (Toronto: Ontario Ministry of Natural Resources, 1976), p. 110; *New York Times*, 6 February 1977.
185. IIIS, *Raw Materials and Foreign Policy*, p. 262.
186. FEMA, *Stockpile Report to the Congress*, pp. 16-20.
187. Bureau of Mines, *Mineral Commodity Summaries*.
188. FEMA, *Stockpile Report to the Congress*, p. 11, 1982.
189. M.J. Gauvin, *Nickel*, MR 157, (Ottawa: Department of Energy, Mines and Resources, 1976), p. 47.
190. *Mining Journal*, vol. 283, no. 7268, 1974; *Globe and Mail*, 28 February 1983.
191. *Barron's*, 5 February 1979; *Wall Street Journal*, 9 July 1979; *The Economist*, 2 June 1979.
192. *Northern Miner*, 8 February 1979; *Wall Street Journal*, 9 July 1979; 17 February 1981.
193. P. Crowson, *Non-Fuel Minerals and Foreign Policy*, pp. 11-12; *Globe and Mail*, 28 February 1983; 15 March 1983.
194. *Wall Street Journal*, 9 July 1979.
195. *Mining Journal*, vol. 283, no. 7251, 9 August 1974.
196. *Mining Journal*, vol. 189, no. 7411, 2 September 1977.
197. *Mining Journal*, vol. 290, no. 7447, 12 May 1978; *Northern Miner*, 5 January 1978.
198. *The Economist*, 2 June 1979.
199. *Northern Miner*, 26 April 1979; 12 July 1979; *Globe and Mail*, 28 February 1983; *Northern Miner*, 6 January 1983.
200. R.J. Goodman, and D.D. Brown, *Iron Ore*, MR 148, (Ottawa: Department of Energy, Mines and Resources, 1976), p. 29.
201. Department of Energy, Mines and Resources, *Mineral Policy: A Discussion Paper*, p. 32, has done some research in this area, but for Canadian imports of manganese and chromium.
202. Sweden has already imposed a ban on asbestos and stricter asbestos dust regulations have been created by other countries; *Financial Post*, 5 March 1983.
203. *New York Times*, 13 March 1978.
204. T. Gibson, *Mining in Ontario*, (Toronto: T.E. Brown, 1937).
205. *Ibid.*, p. 83.
206. K. Levitt, *Silent Surrender: The Multinational Corporations in Canada*, (Toronto: MacMillan, 1970), p. 25.
207. Watkins Report (Report of the Task Force on the Structure of Canadian Industry), *Foreign Ownership and the Structure of Canadian Industry*, (Ottawa: Privy Council Office, 1968), p. 300.
208. J. Bayers, 'Canada's Emergence as a Foremost Power', *International Perspectives*, May-June 1975, p. 23.
209. *Ibid.*, p. 24.

210. D.N. Smith, and L.T. Wells, *Negotiating a Third World Mineral Agreement: Promises to Prologue*, (Cambridge, Mass: Ballinger, 1975), pp. 1-2.
211. T.H. Moran, *Multinational Corporations and the Politics of Dependence: Copper in Chile*, p. 13.
212. J.P. Drolet, *Canadian Resource Policy in an Interdependent World*, (Ottawa: Department of Energy, Mines and Resources, 1974).
213. Government of Canada, *Foreign Policy for Canadians*, (Ottawa: Queen's Printer, 1970), p. 25.
214. J.P. Drolet, *Canadian Mineral Policy in an Interdependent World*, p. 13.
215. *Ibid.*, p. 44; see also G.R. Hjorleifson, 'A National Minerals Policy', Resources Policy, vol. 2, no. 1, March 1976, p. 39.
216. A.R. Wiseberg, 'Raw Material Producer Associations and Canadian Policy', *Behind the Headlines*, vol. xxxiv, no. 4, Toronto: Canadian Institute of International Affairs, 1976, p. 7; A. Dow, 'International Minerals Policy Should Be Adopted by Canada', *International Perspectives*, November-December 1977, p. 25.
217. A. Powis, 'Management of Canadian Mineral Resources: An Industry Viewpoint', *Resources Policy*, vol. 2, no. 1, March 1976, p. 12.
218. C.G. Miller, 'Canadian Commodity Investment Issues', submission to the Canadian Group of the Trilateral Commission's Seminar on a *Canadian Perspective on Commodities*, (mimeo), Winnipeg, 1977, p. 13.
219. H.B. Malmgren, 'The Raw Material and Commodity Controversy', *Contemporary Issues*, no. 1, (Washington, D.C.: International Economic Studies Institute, 1975), p. 12. Compare with the views of S. Harris, *Analysis of Commodity Markets for Policy Purposes*, p. 108.
220. *Ibid.*, p. 87.
221. H. Fergey, Cominco's Submission, *Canadian Perspective on Commodities*, p. 5.
222. H.B. Malmgren, 'The Raw Material and Commodity Controversy; *Contemporary Issues*, pp. 4-5; N.D. Olewiler, and P.R. Richardson, 'Changing Mineral Markets: Some Implications for Canada', p. 87.
223. *Globe and Mail*, 4 October 1977.
224. Information Canada, *Towards a Mineral Policy for Canada: Opportunities for Choice*, Ottawa, 1974, p. 53; Calura, Statistics Canada; this is the standard measure used by the federal government.
225. D.J. Patton, 'The Evolution of Canadian Federal Mineral Policies', p. 235; 0.5 percent is unaccounted for; this is probably due to rounding error.
226. G.O. Vagt, 'Asbestos', *Canadian Mining Journal*, February 1982, p. 122.
227. Department of Energy, Mines and Resources, *Potash: A Proposed Strategy*, MR 194, Ottawa, 1982, p. 16.
228. It should be noted that some of this competition comes from Canadian-owned mineral operations in the Third World.
229. nm, *Basic Data for Estimating U.S. Mineral Requirements and Availability*, p. 109.
230. R.A. MacKay, (ed.), *Canadian Foreign Policy: 1945-1954*, (Toronto: McClelland and Stewart, 1971), pp. 192-5.
231. A.E. Blanchette, (ed.), *Canadian Foreign Policy: 1955-1965*, (Toronto: McClelland and Stewart, 1977), pp. 155-62.
232. R.A. MacKay, *Canadian Foreign Policy: 1945-1954*, pp. 226, 55-59.
233. *Ibid.*, p. 87.
234. A.E. Blanchette, *Canadian Foreign Policy: 1955-1965*, p. 250.
235. *Ibid.*, p. 270.
236. *Ibid.*, p. 263.
237. J.P. Drolet, *International Mining Development and Foreign Investment*, (Ottawa: Department of Energy, Mines and Resources, 1980), pp. 13-14.
238. H.C. Armstrong, 'The United States Market for Canadian Minerals', p. 54.

239. V.C. Wansbrough, 'Removal of Quotas on Lead and Zinc', *Western Mining*, vol. 38, no. 11, November 1965, p. 22.
240. *Northern Miner*, 20 April 1978; *Northern Miner*, 26 October 1978.
241. V.C. Wansbrough, 'Removal of Quotas on Lead and Zinc', p. 22; G.M. MacNabb, 'Canada and the United States: A Perspective on National Resource Policy', *Canadian Business Review*, Winter 1977, p. 37.
242. One of the main purposes for the timing of the legislation was to take advantage of existing EEC and Japanese fears of raw material shortages and so to give Canada some psychological leverage at the Multilateral Trade Negotiations. Minerals are covered under section C9 group 5 of the Act.
243. D.J. Patton, 'The Evolution of Canadian Federal Mineral Policies', p. 243, footnote 59.
244. Canada supplies 33 percent of West Germany's uranium requirements and 70 percent of Japan's; no figures are available for the USA.
245. COCOM is administered out of the U.S. Embassy in Paris. COCOM would have moved to Brussels along with NATO but France would have withdrawn from COCOM as it did from NATO if such a move had been made.
246. GAO (General Accounting Office), *Export Controls: Need to Clarify Policy and Simplify Administration*, report on the Congress of the United States, Washington, D.C., 1979, p. 7.
247. J. Kaplan, 'U.S. Resource Policy: Canadian Connections', p. 110.
248. GAO, *Export Controls: Need to Clarify Policy and Simplify Administration*, p. 8.
249. *Ibid.*, p. 9.
250. The Reagan administration is trying to expand the Embargo List to include technology such as fibre optics and electronics-grade silicon and to give COCOM some role in enforcement; *The Economist*, 20 November 1982.
251. GAO, *Export Controls: Need to Clarify Policy and Simplify Administration*, pp. 23-27.
252. GAO, *Export Controls: Need to Clarify Policy and Simplify Administration*, p. 29; this information is also based on conversations with an external affairs official in Ottawa.
253. *Financial Times* (Canada) 31 October and 6 November 1977.
254. *Northern Miner*, 10 February 1979.
255. J.P. Drolet, *Canadian Mineral Policy in an Interdependent World*, p. 58; see also J.P. Drolet, *Canadian Minerals: A New Dimension in World Trade*, (Ottawa: Energy, Mines and Resources, 1965), p. 14; Federal Government Commission, *Canadian Perspective on Commodities*, p. 1.
256. C.J. Johnson, *Mining Congress Journal*, p. 33; P. Crowson, *Non-Fuel Minerals and Foreign Policy*, p. 15; J.P. Drolet, *Canadian Minerals: A New Dimension in World Trade*, pp. 13-14.
257. J.P. Drolet, *Canada Resource Policy in an Interdependent World*, p. 11.
258. *Globe and Mail*, 17 August 1974; 1982 discussions with Canadian officials.
259. Canada has also participated in wheat producer associations since the 1930s.
260. Previously, Ottawa had been unable to interest the United States in an international commodity agreement for uranium.
261. Sources for this material on the uranium cartel are as follows: *Northern Miner*, 2 March 1972; 16 June 1977; 23 June 1977; 20 October 1977; *Globe and Mail*, 17 June 1977; 30 September 1977; 1 October 1977; 28 October 1977; 8 February 1978; *New York Times*, 30 August 1976; 9 July 1978; *Financial Post*, 18 July 1981. Stewart, L.R., 'Canada's Role in the International Uranium Cartel', *International Organization*, vol. 35, no. 4, Autumn 1981, pp. 669-670, 683.
262. There appears to be a double standard here, if we compare the uranium situation with the lack of U.S. action against American oil companies both prior to and after 1973: 'the international oil companies received a formal American antitrust exemption in order to bargain collectively with the oil producing countries'; quoted from I.A. Litvak, and C.J. Maule, 'Corporate Metamorphosis: The Case of the Multinational Resource Company', in M.G. Fry, (ed.), *Freedom and Change: Essays in Honour of Lester B. Pearson*, (Toronto:

McClelland and Stewart, 1975), p. 211.

263. Westinghouse, in promoting its sales of nuclear reactors, had offered customers contracts for a lifetime supply of uranium at $10-$11 (U.S.) per pound. When the price rose above this level, Westinghouse defaulted on its contracts, was sued by its customers and in turn sued the companies which participated in the uranium cartel, blaming them for the increase in uranium prices. In March 1981, Rio Algom, Denison Mines and 10 other American, British, Australian and South African uranium companies reached an out-of-court settlement with Westinghouse ($39 million U.S.) and the Tennessee Valley Authority ($2 million U.S.). However, these uranium companies insisted that the settlement was in no way to be considered an admission of wrong-doing. Rather it was intended to avoid the 'inconvenience and cost of lengthy litigation'; *Globe and Mail*, 18 March 1981. In January 1981, Gulf Minerals paid Westinghouse $25 million in an out-of-court settlement and agreed to assume certain Westinghouse obligations to supply uranium; *Globe and Mail*, 30 January 1981. By way of comparison, Westinghouse had paid $1.1 billion (total pre-tax cost) to its customers in out-of-court settlements by April 1981; Wall Street Journal, 16 April 1981).
264. *Northern Miner*, 16 June 1977.
265. J.P. Drolet, *Canadian Resource Policy in an Interdependent World*, p. 11.
266. L.R. Stewart, 'Canada's Role in the International Uranium Cartel', *International Organization*, vol. 35, no. 4, Autumn 1981, pp. 680-683.
267. mm, *Basic Data for Estimating U.S. Mineral Requirements and Availability*, p. 109.
268. *Northern Miner*, 9 February 1978.
269. M.J. Gauvin *et al.*, *Nickel*, p. 32.
270. *Northern Miner*, 18 January 1979.
271. *Financial Times* (Canada), 25 October 1982; *Globe and Mail*, 20 August 1982; *Globe and Mail*, 'Report on Mining', 22 October 1982. In November 1982, the price of nickel on the London Metal Exchange was $1.90 (U.S.) per pound compared to the producers posted price of $3.20 (U.S.); *Northern Miner*, 4 November 1982.
272. Mineral Resources Branch, *The Ontario Metal Mining Industry: Present and Future*, (Toronto: Ontario Ministry of Natural Resources, 1977), p. 20; Cuba's main Western customers are France, Italy, Spain and the Netherlands.
273. *The Economist*, 22 November 1980.
274. *Financial Times* (Canada), 25 October 1982.
275. T.P. Mohide *et al.*, *Towards a Nickel Policy for the Province of Ontario*, pp. 3, 76; see also Department of Energy, Mines and Resources, *Mineral Policy: A Discussion Paper*, p. 43.
276. T.P. Mohide *et al.*, *Towards a Nickel Policy for the Province of Ontario*, p. 169.
277. *Ibid.*, p. 193.
278. *Northern Miner*, 18 January 1979.
279. *Mining Journal*, vol. 284, no. 7272, 3 January 1975.
280. T.P. Mohide *et al.*, *Towards a Nickel Policy for the Province of Ontario*, p. 11.
281. I. Walter, *A Discussion of the International Economic Dimensions of Secondary Materials Recovery*, Contemporary Issues, No. 2, (Washington: International Economic Studies Institute, 1975), p. 6.
282. *Financial Post*, 4 November 1978.
283. Ontario Ministry of Natural Resources, *Ontario Mineral Review 1976-1977*, Toronto, 1978, p. 17.
284. The financial losses of strikers were partly offset by strike-pay, credit, new jobs for those who quit and unemployment insurance; *Globe and Mail*, 5 June 1979.
285. Mineral Resources Branch, *The Ontario Metal Mining Industry: Present and Future*, p. 19; see also *Globe and Mail*, 27 November 1980, 22 October 1982.
286. T.P. Mohide *et al.*, *Towards a Nickel Policy for the Province of Ontario*, p. 63. However,

Inco mothballed its Guatemalan facility in 1981 and severely cut back production in Indonesia in 1982.

287. In fact, Canadian nickel production facilities were shut down completely for about 10 months in 1982-83, while nickel continued to be produced, albeit often at lower rates, in Third World countries.
288. M. Radetzki, *International Uranium: Economic and Political Instability in a Strategic Commodity Market*, (Stockholm: Institute for International Economic Studies, University of Stockholm, 1980), p. 7.5.
289. *Globe and Mail*, 18 September 1982.
290. R.B. Elver *et al.*, *Mineral Industry Trends and Economic Opportunities*, MR 158, (Ottawa: Department of Energy, Mines and Resources, 1976), p. 15; See also appendix III.
291. Bureau of Mines, *Mineral Facts and Problems*, (Washington, D.C.: U.S. Department of the Interior, 1970), p. 851.
292. *Canadian Mining Journal*, February 1982.
293. *Northern Miner*, 24 August 1978.
294. *Northern Miner, 20 April 1978; Globe and Mail*, 26 November 1977.
295. E. Kilmarx, 'Politics of Mineral Supply', *Mining Congress Journal*, vol. 61, no. 2, February 1975.
296. S.D. Strauss, 'Does the Pattern of Oil Prices Set a Precedent for Metals?', *Mining Congress Journal*, vol. 60, no. 2, April 1974.
297. J.E. Tilton, *The Future of Non-Fuel Minerals*, p. 85. For an argument that the USSR quietly agreed to form a cartel with De Beers, see E.J. Epstein, 'Have You Ever Tried To Sell A Diamond', *The Atlantic Monthly*, February 1982. It now appears that the USSR no longer uses De Beers' Central Selling Organization to sell diamonds, but has broken off formal cartel contact by selling through a London merchant house and undercuts the CSO price by up to 15 percent. *The Economist*, 23 February 1980; 17 January 1981.
298. *Industrial Minerals*, No. 41, February 1971, p. 9.
299. C.F. Bergsten *et al.*, 'U.S. Commodity Policy: The Integration of Domestic and International Requirements', pp. 443-44.
300. A.A. Jordan, and R.A. Kilmarx, *Strategic Mineral Dependence: The Stockpile Dilemma*, p. 21.
301. G.O. Vagt, *Asbestos*, MR 155, (Ottawa: of Energy, Mines and Resources, 1976), pp. 23-4.
302. *Globe and Mail*, 5 December 1978.
303. *Globe and Mail*, 21 December 1978.
304. *Globe and Mail*, 14 June 1982; 22 October 1982. Johns-Manville is now trying to get out of the asbestos business.
305. Communications with G.O. Vagt, Department of Energy, Mines and Resources.
306. G.O. Vagt, *Asbestos*, 1976, p. 10.
307. *Ibid.*, pp. 8, 10.
308. E. Whelan, *Facts on Potash*, (Regina: Department of Mineral Resources, 1975), p. 8.
309. W.E. Koepke, *Structure, Behaviour and Performance of the World Potash Industry*, MR 139, (Ottawa: Department of Energy, Mines and Resources, 1973), p. 1.
310. For more details, see P.J. Caragata, 'Non-Fuel Minerals and Canadian Foreign Policy: Negotiations from Strengths and Weakness', pp. 376-415.
311. Energy, Mines and Resources Canada, *Potash: A Proposed Strategy*, MR 194, Ottawa, 1982, p. 4.
312. *Ibid.*, p. 17.
313. R.B. Elver *et al.*, *Mineral Industry Trends and Economic Opportunities*, p. 17; C.J. Cajke, 'The Global Approach to Mineral Problems: A Scramble for Market Share', p. 23.
314. R.F. Mikesell, *The World Copper Industry: Structure and Economic Analysis*, p. 212.
315. *Ibid.*, p. 347.

316. Compare 96 percent for aluminum, 63 percent for lead and 63 percent for zinc; *New York Times*, 15 January 1979.
317. P. Connelly, and R. Perlman, *The Politics of Scarcity: Resource Conflicts in International Relations*, p. 85.
318. R.F. Mikesell, *The World Copper Industry: Structure and Economic Analysis*, pp. 207, 213.
319. *Ibid.*, p. 110.
320. *Ibid.*, p. 212.
321. 'The average second quarter (1982) price (of copper) of 62 cents (U.S.) a pound was well below $1.00 a pound needed by U.S. producers to break even. At current prices (68 cents a pound), only Latin American producers, whose breakeven point is about 68 cents a pound, can produce profitably. Canadian mines require 80 cents (U.S.) a pound to break even;' *Globe and Mail*, 22 October 1982. For a different conclusion about world copper production costs, see Energy, Mines and Resources, *Mineral Policy: A Discussion Paper*, p. 44.
322. Federal Government Contribution, *Canadian Perspective on Commodities*, p. 2.
323. The five departments were Industry, Trade and Commerce; Energy, Mines and Resources; Finance; External Affairs; Consumer and Corporate Affairs.
324. *Northern Miner*, 11 January 1979.
325. W.J. Barbour, Background Paper, Submission to the Canadian Group of the Trilateral Commissions's Seminar on a *Canadian Perspective on Commodities*, (mimeo), Winnipeg, November 1977, p. 13.
326. H. Fargey, Cominco's submission, *Canadian Perspective on Commodities*, pp. 4-5.
327. W.E. Haviland, 'Commodity Prices and Earnings, Stabilization', Canadian Group of the Trilateral Commission's Seminar on a *Canadian Perspective on Commodities*, (mimeo), Winnipeg, November 1977, pp. 5-6.
328. W.J. Barbour, Background Paper, *Canadian Perspective on Commodities*, pp. 14-16; W.E. Haviland, 'Commodity Prices and Earnings, Stabilization', *Canadian Perspective on Commodities*, pp. 5-6; H. Fargey, Cominco's Submission, *Canadian Perspective on Commodities*, p. 4.
329. See J.P. Drolet, *Canadian Mineral Policy in an Interdependent World*, p. 57.
330. *The Economist*, 18 November 1978.
331. *Globe and Mail*, (8 August 1979; 7 December 1979; 14 March 1980).
332. Demand is now expected to grow by about 2.1 percent per year over the next 10 years; *Globe and Mail*, 2 October 1982.
333. M.J. Lord, *The Impact of International Price Stabilization Schemes on Primary Producing Countries*, p. 16.
334. *Ibid.*, pp. 10, 11, 15.
335. R.F. Mikesell, *The World Copper Industry: Structure and Economic Analysis*, p. 193.
336. J.R. Behrman, *International Commodity Agreement: An Evaluation of the* UNCTAD *Integrated Commodity Programme*, pp. 5, 13.
337. M.J. Lord, *The Impact of International Price Stabilization Schemes on Primary Producing Countries*, p. 15.
338. This idea is now supported by the UNCTAD secretariat; Office of the U.S. Trade Representative, 2 September 1982.
339. Based on discussions with American and Canadian officials in Washington and Ottawa.
340. Department of Energy, Mines and Resources; and Department of External Affairs.
341. 52.3 percent of copper production is recycled in the USA; *Northern Miner*, 14 February 1980.
342. *Financial Post*, 29 March 1980.
343. See for example: C.F. Bergsten *et al.*, 'U.S. Commodity Policy: The Integration of Domestic and International Requirements', p. 9; R.F. Mikesell, *The World Copper Industry: Structure and Economic Analysis*, pp. 20, 198; S.D. Strauss, Statement on Behalf of the American Mining Congress Before the Trade Policy Staff Committee, Office of the U.S. Trade

Representative, p. 9; *New York Times*, 21 March 1977; *The Economist*, 18 November 1978; *Northern Miner*, 3 June 1976.

344. C.G. Miller, 'Canadian Commodity Investment Issues', p. 10.
345. Federal Government Contribution, *Canadian Perspective on Commodities*.
346. P.V. Lyon, 'The Trudeau Doctrine', *International Journal*, vol. XXVI, no. 1, Winter 1970-71, p. 21.
347. L.H. Gelb, 'Muskie and Brzezinski: The Struggle Over Foreign Policy', *The New York Times Magazine*, 20 July 1980, p. 35.
348. J.P. Drolet, *Canadian Mineral Policy in an Interdependent World*, pp. 44-45.
349. Jean-Paul Drolet, Assistant Deputy Minister, Department of Energy, Mines and Resources, quoted in CMOS, a quarterly published by the department, Summer 1978, p. 14.
350. C.F. Bergsten *et al.*, 'U.S. Commodity Policy: The Integration of Domestic and International Requirements', p. 156.
351. P. Connelly, and R. Perlman, *The Politics of Scarcity: Resource Conflicts in International Relations*, pp. 122-23.
352. K. Levitt, *Silent Surrender: The Multinational Corporation in Canada*.
353. J. Eayers, 'Canada's Emergence as a Foremost Power', *International Perspectives*.
354. *Globe and Mail*, 28 January 1981.
355. Ilmar Martens, nickel analyst with Walwyn, Stodgell, Cochran, Murray, in *Northern Miner*, 25 November 1982.
356. *Globe and Mail*, 21 December 1982.
357. Bureau of Mines, *Mineral Commodity Summaries*, p. 12.
358. H.C. Armstrong, 'The Nature of the Problem', p. 16; S. Harris, *Analysis of Commodity Markets for Policy Purposes*, p. 258.
359. *Industrial Minerals*, no. 26, November 1969, p. 45.
360. A.R. Ritter, *Conflict and Coincidence of Canadian and Less Developed Country Interests in International Trade in Primary Commodities*, pp. 143-44.
361. *Ibid.*, p. 54.
362. See for example: *Northern Miner*, 9 December 1982; *Globe and Mail*, 18 September 1982; *Financial Times* (Canada), 20 December 1982.
363. Falconbridge reopened its mines in January 1983. *Northern Miner*, 9 December 1982; *Globe and Mail*, 18 September 1982; *Financial Times* (Canada), 20 December 1982.
364. FEMA, *Stockpile Report to the Congress*, p. 3.
365. *Canadian Mining Journal*, February 1982.
366. T. Greenwood, and A. Streeter Jr., 'Uranium', in Beigie and Hero, p. 325.
367. *The Economist*, 23 February 1980.
368. Except, to some extent, in its foreign aid program.
369. Of course, the same is true in Canada's relations with the LDC (see G.K. Helleiner and D. Welwood, *Raw Materials Processing in Developing Countries and Reductions in the Canadian Tariff*, Paper No. 111, (Ottawa: Economic Council of Canada, 1978). At least in terms of refined and semimanufactured minerals, the USA is more responsive to Canadian requests for lower tariffs than either Japan or the EEC.
370. *Northern Miner*, 27 November 1977; MacNabb, G.M., 'Canada and the United States: A Perspective on National Resource Policy', *Canadian Business Review*, p. 40.

Bibliography

Acheson, D., *Present At The Creation*, (New York: Signet, 1969).

Aitken, H.G.J., 'The Changing Structure of the Canadian Economy', in *The American Economic Impact on Canada*, (Durham, North Carolina: Duke University Press, 1959).

Aitken, H.G.J., *American Capitalism and Canadian Resources*, (Cambridge, Mass.: Harvard University Press, 1961).

AMC (American Mining Congress), 'The Stockpile Story', *Mining Congress Journal*, March 1963.

Andrews, P.W., *The Canadian Mineral Industry and the Economy* (revised edition) MR 128, (Ottawa: Dept. of Energy, Mines and Resources, 1975).

Annex to the Federal Government Contribution to the Canadian Group of the Trilateral Commission's Seminar on a *Canadian Perspective on Commodities*, (mimeo) Winnipeg, November 1977.

Armstrong, H.C., 'The United States Market for Canadian Minerals', *CIM Bulletin*, vol. 64, no. 707, March 1971.

Armstrong, H.C., 'Investment in the Canadian Non-Fuel Minerals Industry', submission to the Canadian Group of the Trilateral Commission's Seminar on a *Canadian Perspective on Commodities*, (mimeo) Winnipeg, November 1977.

Armstrong, H.C., 'The Nature of the Problem' in *International Competition and the Canadian Mineral Industries*, (Kingston: Centre for Resource Studies, 1978)

Ashworth, J.H., 'Continuity and Change in the U.S. Decision-Making Process in Raw Materials', in *Natural Resources in U.S.-Canadian Relations: The Evolution of Policies and Issues*, vol. 1, (Boulder, Colorado: Westview Press, 1980).

Avramovic, D., 'Common Fund: Why and of What Kind?', *Journal of World Trade Law*, vol. 12, no. 5, 1978.

Banks, F.E., 'Problems of Mineral Supply', in *Future Resources and World Development*, (New York: Plenum Press, 1976).

Bambrick, S., 'Mineral Processing in Australia: What Price Resources Diplomacy?', *The Australian Quarterly*, vol. 47, no. 1, March 1975.

Barbour, W.J., Background Paper, Submission to the Canadian Group of the Trilateral Commission's Seminar on a *Canadian Perspective on Commodities*, (mimeo) Winnipeg, November 1977.

Barkman, K., 'The International Tin Agreements', *Journal of World Trade Law*, vol. 9, September-October 1975.

Barkman, K., 'Costs and Finance of the Tin Buffer Stock', *Journal of World Trade Law*, vol. 10, November-December 1976.

Behrman, J.R., *International Commodity Agreement: An Evaluation of the UNCTAD Integrated Commodity Programme*, (Washington, D.C.: Overseas Development Council, 1977).

Beigie, C.E., *et al.*, *Seeking a New Accommodation in World Commodity Markets*, (New York: The Trilateral Commission, 1976).

Beigie, C.E., and Hero Jr., A.O., (eds.), *Natural Resources in U.S.-Canadian Relations: the Evolution of Policies and Issues*, vol. I and vol. II, (Boulder, Colorado: Westview Press, 1980).

Bergsten, C.F., *et al.*, 'U.S. Commodity Policy: The Integration of Domestic and International Requirements', remarks by the Assistant Secretary of the Treasury for International Affairs, before the Financial Conference of the American Mining Congress, Phoenix, Arizona, 1978.

Bidwell, P.W., *Raw Materials: A Study of American Policy*, (New York: Harper & Brothers, 1958).

Bishop, F., 'The National Stockpile Act of 1973', *Mining Congress Journal*, vol. 59, no. 5, May 1973.

Blanchette, A.E., (ed.), *Canadian Foreign Policy 1955-1965*, (Toronto: McClelland and Stewart, 1977).

BNAC (British-North American Committee), *Mineral Development in the Eighties: Prospects and Problems*, (Montreal; C.D. Howe Research Institute, 1976).

Bostock, M., and Harvey, C., (eds.), *Economic Independence and Zambian Copper: A Case Study of Foreign Investment*, (New York: Praeger, 1972).

Brash, D.T., 'Australia As Host To The International Corporation', in *The International Corporation*, Cambridge, Mass.: MIT Press, 1979).

Brash, D.T., 'United States Investment in Australia, Canada and New Zealand', in *Direct Foreign Investment in Asia and the Pacific*, (Canberra: Australian National University Press, 1972).

Breton, A., 'The Economics of Nationalism', *Journal of Political Economy*, vol. lxxii, February-December, 1964.

Brock, E.M., and Grilli, E.R., 'Commodity Price Stabilization and the Developing World', *Finance and Development*, March 1977.

Brown, R.D., *et al., Canada's Resources and The National Interest: A Report of An Independent Task Force On the Development of Canada's Petroleum and Mineral Resources*, (Calgary: The Canada West Foundation, 1977).

Bureau of Mines, *Mineral Facts and Problems*, (Washington, D.C.: U.S. Department of the Interior, 1970).

Bureau of Mines, *Mineral Facts and Problems*, (Washington, D.C.: U.S. Department of the Interior, 1976).

Bureau of Mines, *Minerals Yearbook: 1975, Vol. III, Area Reports: International*, (Washington, D.C.: U.S. Department of the Interior, 1978).

Bureau of Mines, *Minerals Commodity Summaries*, (Washington, D.C.: U.S. Department of the Interior, 1979).

Bureau of Mines, *Mineral Commodity Summaries*, (U.S. Department of the Interior, Washington, D.C, 1982).

Bureau of Research and Intelligence, *Nationalization, Expropriation and Other Taking of United States and Certain Foreign Property Since 1960*, (Washington, D.C.: U.S. Department of State, 1971).

Bureau of Research and Intelligence, *Disputes Involving U.S. Foreign Direct Investment, July 1, 1979, Through July 31, 1973*, (Washington, D.C.: U.S. Department of State, 1974).

Caragata, P.J., 'Non-Fuel Minerals and Canadian Foreign Policy: Negotiations from Strength and Weakness', unpublished Ph.D. thesis, University of Toronto, 1981.

Cajka, C.J., 'The Global Approach To Mineral Problems: A Scramble For Market Share', (mimeo), Ottawa, Department of Energy, Mines and Resources, April 1978.

Carlson, J.W., 'Reliable Mineral Supply For the Future', *Mining Congress Journal*, vol. 61, no. 11, November 1975.

Carman, J., 'United Nations Mineral Exploration Activity: 1960-1976', *Natural Resources Forum*, July 1977.

Chambers, W.G., and Reid, J., 'Limitations on Sovereignty Over Natural Resources', *International Perspectives*, November-December, 1977.

Chambers, W.G., Reid, J., and Harris, S.G., *Canadian Minerals and International Economic Interdependence*, MR 162, (Ottawa: Department of Energy, Mines and Resources, 1977).

Chambers, W.G., and Reid, J., 'Canadian Resource Management and the North-South Dialogue', in *Canada's Mineral Trade, The Balance of*

Payments and Economic Development, Proceedings no. 4, (Kingston: Centre for Resource Studies, 1978).

Chilton, D.A., *National Involvement in Ocean Mining*, Resource Management and Conservation Branch Internal Report, (Ottawa: Department of Energy, Mines and Resources, 1977).

Connelly, P., and Perlman, R., *The Politics of Scarcity: Resource Conflicts in International Relations*, (London: Oxford University Press, 1975).

Cooper, R.N., 'Natural Resources and National Security', *Resources Policy*, vol. 1, no. 4, June 1975.

Coopers and Lybrand, *A Comparative Study of Tax Systems and Their Effect on Foreign Mining Investment*, New York, 12 May 1975.

Cordell, A., 'Resources: Implications of Ownership', in *Essays on Aspects of Resource Policy*, Special Study no. 27, (Ottawa: Science Council of Canada, 1973).

Crunstone, D.A., 'Canadian Ore Discoveries, 1946-1978: A Continuing Record of Success', Mineral Policy Sector Internal Report, Ottawa, Department of Energy, Mines and Resources, 1980.

Crowson, P., *Non-Fuel Minerals and Foreign Policy*, (London: Royal Institute of International Affairs, 1977).

Crowson, P. and Francis, S., *Non-Fuel Minerals and Foreign Policy: Data Base*, (London: Royal Institute of International Affairs, 1977).

Cuddy, J.D.A., 'The Common Fund and Earnings Stabilization', *Journal of World Trade Law*, vol. 12, no. 12, 1978.

Daly, D.J., 'Mineral Resources in the Canadian Economy: Macro-Economic Implications', in *Natural Resources and U.S.-Canadian Relations: The Evolution of Policies and Issues*, vol. 1, (Boulder, Col.: Westview Press, 1980).

Department of Energy, Mines and Resources Canada, *Mineral Policy: A Discussion Paper*, (Ottawa: Supply and Services, 1982).

Department of Energy, Mines and Resources Canada, *Potash: A Proposed Strategy*. MR 194, Ottawa, 1982.

Durry, D.R., Michener, C.E., and Booth, J.K.B., 'World Mining Exploration Trends: Politics of Prospecting', *World Mining*, March 1974.

Dickson, R., and Rogers, P., 'Resources, Producer Power and International Relations', in *Future Resources and World Development*, (New York: Plenum Press, 1976).

Diebold, Jr., Wm., 'What Are the Issues?', in *Natural Resources and U.S.-Canadian Relations: The Evolution of Policies and Issues*, vol. 1, (Boulder, Col.: Westview Press, 1980).

Dobell, P.C., *Canada's Search for New Roles: Foreign Policy in the Trudeau Era*, (Toronto: Oxford University Press, 1972).

Dow, A., 'International Minerals Policy Should be Adopted By Canada', *International Perspectives*, November-December, 1977.

Drolet, J.P., *Canadian Minerals: A New Dimension in World Trade*, (Ottawa: Department of Energy, Mines and Resources, 1965).

Drolet, J.P., *International Mining Development and Foreign Investment*, (Ottawa: Department of Energy, Mines and Resources, 1969).

Drolet, J.P., *Canadian Resource Policy in an Interdependent World*, (Ottawa: Department of Energy, Mines and Resources, 1974).

Drolet, J.P., *Canadian Mineral Policy in an Interdependent World*, (Ottawa: Department of Energy, Mines and Resources, 1974).

Drolet, J.P., *Canadian Minerals in a National and International Perspective*, (Ottawa: Department of Energy, Mines and Resources, 1976).

Drolet, J.P., *The Era of Resource Diplomacy: Its Significance For Canadian Minerals*, (Ottawa: Department of Energy, Mines and Resources, 1976).

Drolet, J.P., 'Minerals and the Law of the Sea', address to the Metallurgical Engineering Graduate Students' Society, McGill University, Montreal, Canadian Institute of Mining and Metallurgy, March 23, 1979.

Drysdale, P., (ed.), *Direct Foreign Investment in Asia and the Pacific*, (Canberra: Australian National University Press, 1972).

Dunning, J.H., (ed.), *International Investment*, (Middlesex, England: Penguin. 1972).

Easterbrook, W.T., and Watkins, M.H., (eds.), *Approaches to Canadian Economic History*, (Toronto: McClelland and Stewart, 1976).

Eayers, J., 'Canada's Emergence as a Foremost Power', *International Perspectives*, May-June 1975.

Elver, R.B., *et al., Mineral Industry Trends and Economic Opportunities*, MR 158, (Ottawa: Department of Energy, Mines and Resources, 1976).

English, L.A., 'The Mining Industry in Ontario: A Bankers's Perspective', (mimeo), Toronto, Toronto-Dominion Bank, November 1978.

English, L.A., 'European Participation in Canadian Mineral Resource Development, (mimeo), Toronto, Toronto-Dominion Bank, April 1979.

Epstein, E.J., 'Have You Ever Tried To Sell A Diamond', *The Atlantic Monthly*, February 1982.

Faber, M.L., and Potter, J., *Towards Economic Interdependence: Papers on the Nationalization of the Copper Industry in Zambia*, (Cambridge, England: Cambridge University Press, 1971).

Furgey, H., Cominco's Submission to the Canadian Group of the Trilateral Commission's Seminar on a *Canadian Perspective on Commodities*, Winnipeg, 1977.

Fayerweather, J., *Foreign Investment in Canada: Prospects for National Policy*, (Toronto: Oxford University Press, 1974).

FEMA (Federal Emergency Management Agency), *Stockpile Report To The Congress*, Washington, D.C., 1982.

Ferrigan, J.J., Statements on Behalf of the American Iron and Steel Institute Before the Trade Policy Staff Committee, Office of the U.S. Trade Representative, Washington, D.C., 10 April 1980.

FOC (Federal Government Contribution), Canadian Group of the Trilateral Commission's Seminar on a *Canadian Perspective on Commodities*, (mimeo) Winnipeg, 1979.

Fischer, R.H., Garwood, W.E., Heinemann, H., *Non-Hydrogenative Demetalation of Residua Using Manganese Nodules*, (Paulsboro, New Jersey: Mobil Research and Development Corporation, 1975).

Fischman, L.L., 'Adequacy of World Mineral Supply', *CIM Bulletin*, vol. 70, no. 785, September 1977.

Fish, R., 'Falconbridge Nickel Mines Sudbury Operations', *Canadian Mining Journal*, vol. 97, no. 5, May 1976.

Galway, M.A., *Japanese Involvement in British Columbia Copper*, MR 145, (Ottawa: Department of Energy, Mines and Resources, 1975).

GAO (General Accounting Office), *Export Controls: Need to Clarify Policy and Simplify Administration*, Report to the Congress of the United States, Washington, D.C., 1979.

Gauvin, M.J., *et al.*, *Nickel*, MR 157, (Ottawa: Department of Energy, Mines and Resources, 1976).

Government of Canada, *Foreign Policy for Canadians*, (Ottawa: Queen's Printer, 1970).

Gibson, T., *Mining in Ontario*, (Toronto: T.E. Bowman, 1937).

Gillespie, A., 'Mineral Development: The Federal Government's Presence', *Western Miner*, vol. 49, no. 4, April 1976.

Gilpin, R., 'The Politics of Transnational Economic Relations', in Keohane, R.O., and Nye J., J.S., (eds.), *Transnational Relations and World Politics*, (Cambridge, Mass.: Harvard University Press, 1972).

Giradin, R.S., and Monaghan, B.M., Submission to the Canadian Group of the Trilateral Commission's Seminar on a *Canadian Perspective on Commodities*, Winnipeg, November 1977.

Girvan, N., 'Multinational Corporations and Dependent Underdevelopment

in Mineral Export Economies', *Social and Economic Studies*, vol. 19, no. 4, December 1970.

Girvan, N., *Foreign Capital and Economic Underdevelopment in Jamaica*, (Surrey, England: Unwin Bros, 1971).

Girvan, N., *Copper in Chile: A Study in Conflict Between Corporate and National Economy*, (Surrey, England: Unwin Bros, 1972).

Going, T.P., *An Industrial Analysis of Exploration Activity in Canadian Mineral Exploration, Resources and Outlook*, MR 137, (Ottawa: Energy, Mines and Resources, 1973).

Goodman, R.J., and Brown, D.D., *Iron Ore*, MR 148, (Ottawa: Dept. of Energy, Mines and Resources, 1976).

Gordon, L., 'The Investor's Point of View', in *International Control of Investment: The Dusseldorf Conference on Multinational Corporations*, (New York: Praeger, 1975).

Govett, G.J., and Govett, M.H., 'Mineral Resources and Canadian-American Trade: Double Edged Vulnerability', *CIM Bulletin*, vol. 66, no. 735, July 1973.

Govett, G.J., and Govett, M.H., 'A Canadian Perspective On Commodities Trade Liberalization', Canadian Group of the Trilateral Commission's Seminar on a *Canadian Perspective on Commodities*, Winnipeg, November 1977.

Govett, M.H., and Govett, C.J., 'The Canadian Minerals Industry: A Perspective', *Resources Policy*, vol. 2, no. 1, March 1976.

Grace, R.P., 'Metals Recycling: A Comparative National Analysis', *Resources Policy*, vol. 4, no. 4, December 1978.

Gray Report (Government of Canada), *Foreign Direct Investment in Canada*, (Ottawa: Information Canada, 1972).

Greenwood, T., and Streeter Jr., A., 'Uranium', in *Natural Resources in U.S.-Canadian Relations: the Evolution of Policies and Issues*, vol. II, (Boulder, Col.: Westview Press, 1980).

GSA (General Services Administration), *Stockpile Report to the Congress*, October 1976-March 1977, (Washington D.C.: Federal Preparedness Agency, 1977).

Gunnemann, J.P., (ed.), *The Nation-State and Transnational Corporations in Conflict*, (New York: Praeger, 1975).

Hannuld, J.A., 'Why in Canada?', *Canadian Mining Journal*, April 1975.

Harris, S., 'Mineral Resources: Longer Term Issues and Prospects', *The Australian Quarterly*, December 1975.

Harris, S., *Australian Security and Resources Diplomacy: An Economic Viewpoint*, 46th ANZAAS Congress, Canberra, Australia, 21 January 1975.

Harris, S., *Materials Supply and Demand Problems (Near and Long Term) and Related Issues: Perceptions From the Viewpoint of Relatively Developed Resource-Rich Nations*, (Canberra: Centre for Resource and Environmental Studies, Australian National University, April 1976).

Harris, S., Salmon, M., and Smith, B., *Analysis of Commodity Markets for Policy Purposes*, Thames Essay No. 17, (London: Trade Policy Centre, 1978).

Harvey, C., 'Growth and Structure of the Economy', in *Economic Independence and Zambian Copper: A Case Study of Foreign Investment*, (New York: Praeger, 1972).

Haviland, W.E., *International Commodity Agreements*, (Montreal: Canadian Trade Committee, Private Planning Association, July 1963).

Haviland, W.E., 'Commodity Prices and Earnings Stabilization', Canadian Group of the Trilateral Commission's Seminar on a *Canadian Perspective on Commodities*, Winnipeg, November 1977.

Helleiner, G.K. and Welwood, D., *Raw Materials Processing in Developing Countries and Reductions in the Canadian Tariff*, Paper No. 111, (Ottawa: Economic Council of Canada, 1978).

Hemmie, K., *et al.*, *Trade in Primary Commodities: Conflict of Cooperation?*, A tripartite report, (Washington, D.C.: The Brookings Institution, 1974).

Hirschman, A., *How to Divest in Latin America*, Essays in International Finance, no. 76, Princeton, N.J., November 1969.

Hjorleifson, G.R., 'A National Minerals Policy', *Resources Policy*, vol. 2, no. 1, March 1976.

Hutchinson, R.D., 'Canada as a Supplier of Minerals', *CIM Bulletin*, May 1976.

Hymer, S., *International Operations of National Firms: A Study of Direct Foreign Investment*, Ph.D. thesis, MIT, 1960, (Cambridge, Mass.: Harvard University Press, 1976).

Hyndman, J.E. 'National Interest and the New Outlook', *International Journal*, vol. xxvi, no. 1, Winter 1970-71.

Information Canada, *Towards a Mineral Policy for Canada: Opportunities for Choice*, 1974.

IIES (International Economic Studies Institute), *Raw Materials and Foreign Policy*, Washington, D.C., 1976.

IIM, *Basic Data for Estimating U.S. Mineral Requirements and Availability*, Washington, D.C., February 1976.

Japanese Delegation, 'Outline of Japanese Mining Policy and Statistics' (metal, coal and petroleum) submission for the Third Session of the Committee on Natural Resources, Bangkok, September 21-27, 1976.

Johns, B.L., 'Foreign Investment in Australia's Natural Resources', in *The Natural Resources of Australia: Prospects and Problems*, (Sydney: Angus and Robertson, 1972).

Johnson, C.J., 'Cartels in Minerals and Metal Supply', *Mining Congress Journal*, vol. 62, no. 1, January 1976.

Joint Staff, 'The Problem of Stabilization of Prices of Primary Products', (mimeo) Washington, D.C., IMF-IBRD, 1969.

Jones, W.R., *Minerals in Industry*, (London: Pelican Books, 1955).

Jordon, A.A. and Kilmarx, R.A., *Strategic Mineral Dependence: The Stockpile Dilemma*, The Washington Papers, vol. vii, no. 70, (Beverly Hills and London: Sage Publications, 1979).

Kaplan, J., 'U.S. Resource Policy: Canadian Connections', in *Natural Resources in U.S.-Canadian Relations: the Evolution of Policies and Issues* (Boulder, Co.: Westview Press, 1980).

Kaplan, J.J. and Stanley, T.W., *Dependence and Vulnerability: The United States and Imported Raw Materials*, Contemporary Issues, no. 3, (Washington, D.C.: International Economic Studies Institute, 1977).

Kapoor, A., *Planning for International Business Negotiation*, (Cambridge, Mass: Ballinger, 1975).

Kierans, E., 'Canadian Resources Policy', *Canadian Forum*, June-July 1973.

Kilmarx, E., 'The Politics of Mineral Supply', *Mining Congress Journal*, vol. 61, no. 2, February 1975.

Kindleberger, C.P., (ed.) *The International Corporation*, (Cambridge, Mass.: MIT Press, 1970).

Knorr, K., *Power and Wealth: The Political Economy of International Power*, (New York: Basic Books, 1973).

Koepke, W.E., *Structure, Behaviour and Performance of the World Potash Industry*, MR 139, (Ottawa: Department of Energy, Mines and Resources, 1973).

Kramer, S.D., *Defending the National Interest: Raw Materials, Investments and U.S. Foreign Policy*, (Princeton: Princeton University Press, 1978).

Lafkas, C. and Paterson, J.G., *A Survey of Resources and Production Cycle for the Non-Ferrous Metals*, Working Paper no. 11, (Kingston: Centre for Resource Studies, 1978).

Landes, D., *The Unbound Prometheus*, (London: Cambridge University Press, 1969).

Landsberg, H.H., 'Energy and Minerals: How They Differ in the International Context', *Engineering and Mining Journal*, vol. 177, no. 10, October 1976.

Laughlin, W.H., 'Exploration for Metals in Canada: Statistical Trends, 1960-1978', Mineral Policy Sector Internal Report, Ottawa, Department of Energy, Mines and Resources, 1979.

Laux, J.K., and Molot, M.M., 'Multinational Corporations and Economic Nationalism: Conflict Over Resource Development in Canada', *World Development*, vol. 6, no. 6, June 1978.

Levitt, K., *Silent Surrender: The Multinational Corporation in Canada*, (Toronto: Macmillan, 1970).

Lipson, C.H., 'Corporate Preferences and Public Policies: Foreign Aid Sanctions and Investment Protection', *World Politics*, 28 April 1976.

Litvak, I.A., and Maule, C.J., 'Corporate Metamorphosis: The Case of the Multinational Resource Company', in Fry, M.G. (ed.), *Freedom and Change: Essays in Honour of Lester B. Pearson*, (Toronto: McClelland and Stewart, 1975).

Lord, M.J., 'The Impact of International Price Stabilization Schemes on Primary Producing Countries', (draft) Washington, D.C., Inter-American Development Bank, 1980.

Lyon, P.V., 'The Trudeau Doctrine', *International Journal*, vol. xxvi, no. 1, Winter 1970-71.

MAC (Mining Association of Canada), *Mining: What Mining Means to Canada*, Ottawa, February 1974.

MAC, *Mining in Canada - Issues and Concerns: An Outward Looking Mineral Policy, Part 1: The Exploration Frontier*, Ottawa, July 1977.

MAC, *Future Opportunities for Canadian Mining*, Ottawa, 1978.

MAC, *Mining in Canada: Facts and Figures*, Ottawa, 1979, 1982.

MAC, *Canadian Mining Industry: Issues for the 1980s*, Ottawa, March 1980.

Macdonald, D.S., 'Mineral Development in Canada: A Look at the 70s and Beyond', *Western Miner*, vol. 47, no. 4, April 1974.

MacGregor, I., 'Mining and the Continuing American Revolution', *Mining Congress Journal*, vol. 62, no. 11, November 1976.

MacIntosh, R.M., 'The Linkage of Issues in Canada-U.S. Relations', *Canadian Business Review*, Winter 1977.

MacKay, R.A., (ed.), *Canadian Foreign Policy: 1945-1954*, (Toronto: McClelland & Stewart, 1971).

Mackenzie, B.W., *Nickel: Canada and the World*, Mineral Report 16, (Ottawa: Energy, Mines and Resources, 1968).

MacKinnon, J.G., 'New Mine Development: The Impact on Canada's Balance of Payments', in *Canada's Minerals Trade, the Balance of Payments and Economic Development*, Proceedings no. 4, (Kingston: Centre for Resource Studies, 1978).

MacNabb, G.M., 'Canada and the United States: A Perspective on National Resource Policy', *Canadian Business Review*, Winter 1977.

Malenbaum, W., 'Metals for Man's Survival', *Mining Congress Journal*, February 1975.

Malmgren, H.B., 'The Raw Material and Commodity Controversy', *Contemporary Issues*, no. 1, (Washington, D.C.: International Economic Studies Institute, 1975).

Marin, H.L., Cranstone, D.A., and Zwartendyk, J., *Metal Mining in Canada 1976-2000*, MR 167, (Ottawa: Energy, Mines and Resources, 1976).

MacCulla, D.J., 'Minerals and the Canadian Development Process: Paradise Lost?' in *Canada's Mineral Trade, The Balance of Payments and Economic Development*, Proceedings no. 4, (Kingston: Centre for Resource Studies, 1978).

McDermott, E.A., 'An Open Letter on Stockpiling', *Mining Congress Journal*, June 1963.

McDivitt, J.F., *Minerals and Men*, (Baltimore: The Johns Hopkins Press, 1965).

McInnes, R., 'U.S. Mining Investments in Canada', *Mining Congress Journal*, March 1967.

Mikdashi, Z., 'Influencing the Environment for Primary Commodities', *Journal of World Trade Law*, vol. 8, no. 2, March/April, 1974

Mikesell, R.F. (ed.,), *Foreign Investment in the Petroleum and Mineral Industries*, (Baltimore: Johns Hopkins University Press, 1974).

Mikesell, R.F., *Foreign Investment in Copper Mining: Case Studies of Mines in Peru and Papua New Guinea*, (Baltimore: Johns Hopkins University Press, 1975).

Mikesell, R.F., *New Patterns of World Mineral Development*, (Washington, D.C.: British-North America Committee, 1979).

Mikesell, R.F., *The World Copper Industry: Structure and Economic Analysis*, (Baltimore and London: Johns Hopkins University Press for Resources for the Future, 1979).

Miller, C.G., 'Canadian Commodity Investment Issues', submission to the Canadian Group of the Trilateral Commission's Seminar on a *Canadian Perspective on Commodities*, Winnipeg, 1977.

Miller, C.G., 'Investment Attractiveness: One Aspect of Competitiveness', in *International Competition and the Canadian Mineral Industries*, Proceedings no. 2, (Kingston: Centre for Resource Studies, 1978).

Miller, F.S., 'Mining and Mineral Policy: A Provincial Perspective, (mimeo), Office of the Minister of Natural Resources, Toronto, 1977.

Mingst, K.A., 'Economic Determinants of International Commodity Regulations', *Journal of World Trade Law*, vol. 13, no. 2, March-April 1979.

MITI (Ministry of International Trade and Industry), *White Paper on International Trade*, Tokyo, Japan, 1976, and 1978.

Mohide, T.P., *et al.*, *Towards a Nickel Policy for the Province of Ontario*, Mineral Policy Background Paper No.4, (Toronto: Ontario Ministry of Natural Resources, 1977).

Molot, M.A., and Laux, J.K., 'The Politics of Nationalization', *Canadian Journal of Political Science*, vol. xii, no. 2, June 1979.

Moran, T.H., *Multinational Corporations and the Politics of Dependence: Copper in Chile*, (Princeton, N.J.: Princeton University Press, 1974).

Moran, T.H., 'The Theory of International Exploitation in Large Natural Resource Investments', in Rosen, S.J., and Kurth, J.R., (eds.), *Testing Theories of Economic Imperialism*, (New York: D.C. Heath and Co, 1974)

Mouzon, O.T., *International Resources and National Policy*, (New York: Harper and Bros., 1959).

MRB (Mineral Resources Branch), *The Ontario Metal Mining Industry: Present and Future*, (Toronto: Ontario Ministry of Natural Resources, 1977).

MRB, *The Future of Nickel and the Law of the Sea*, Mineral Policy Background Paper No. 10, (Toronto: Ontario Ministry of Natural Resources, 1980).

Muller, R., 'The Global Corporation and Private Sector Transformation: Instability and Public Sector Lag', in *The Nation-State and Transnational Corporations in Conflict*, (New York: Praeger, 1975).

Mumford, L., *Technics and Civilization*, (New York: Harcourt, Brace and World Inc., 1963).

Murphy, J.M., 'Deepsea Mining Legislation Viewed as Urgent', *Mining Congress Journal*, vol. 62, no. 3, March 1976.

Newbery, D.M.G., and Stiglitz, J.E., *The Theory of Commodity Price Stabilization: A Study in the Economics of Risk*, (New York: Oxford University Press, 1981).

Nguyen, D.T., 'The Effects of Price Stabiliation on Export Instability and Level: Implications for the North-South Negotiations', in Sengupta, A., (ed.), *Commodities Finance and Trade: Issues in North-South Negotiations,* (London: Frances Pinter (Publications) Ltd., 1980).

Nickel, P.E., *et al., Economic Impacts and Linkages of the Canadian Mining Industry,* (Kingston: Centre for Resource Studies, 1978).

Norrie, K.H., 'Natural Resources, Economic Development and U.S.-Canadian Relations', in *Natural Resources in U.S.-Canadian Relations: The Evolution of Policies and Issues,* vol. 1, (Boulder, Col: Westview Press, 1980).

North-South Institute, *North-South Encounter: The Third World and Canadian Performance,* Canada North-South 1977-78, Ottawa, 1977.

North-South Institute, *Commodity Trade: Test Case for a New Economic Order,* Canada North-South 1977-78, vol. 3, Ottawa, 1978.

Nowlan, J.P., 'Canadian Mineral Policy', *Western Miner,* vol. 46, no. 10, October 1973.

O'Connor, H., *World Crisis in Oil,* (London: Elek Books, 1962).

OISM (Office of Industrial and Strategic Materials), *Non-Fuel Minerals Policy Review: Availability of Foreign Minerals to the United States and its Allies,* Washington, D.C., Bureau of Economic and Business Affairs, U.S. Department of State, (working paper), 1980.

Olewiler, N.D., and Richardson, P.R., (eds.), *Rate-of-Return Taxation of Minerals,* Proceedings no. 1, (Kingston: Centre for Resource Studies, 1977).

Olewiler, N., and Richardson, P.R., 'Changing Mineral Markets: Some Implications for Canada', in *International Competition and the Canadian Mineral Industries,* (Kingston: Centre for Resource Studies, 1978).

OMNR (Ontario Ministry of Natural Resources), *Ontario Mineral Review: 1976-1977,* Toronto, 1978.

O'Neill, R., 'The Strategic View: Fears and Phobias', in Hastings, P., and Farran, A., (eds.), *Australia's Resources Future,* (Melbourne: Thomas Nelson, Australia, Pty. Ltd., 1978).

OPIC (Overseas Private Investment Corporation), *Annual Report* for 1973, Washington D.C., 1974.

OPIC, *Annual Report* for 1974, Washington, D.C., 1975.

OPIC, *Annual Report* for 1978, Washington, D.C., 1979.

OPIC, *Annual Report,* for 1979, Washington, D.C., 1980.

Pasho, D.W., 'Calculating the Production Ceiling Using the NGI/10 Formation', Internal Report, Ottawa, Energy, Mines and Resources, 1978.

Pasho, D.W., 'Ocean Mining', Internal Report, Ottawa, Energy, Mines and Resources, 1979.

Patton, D.J., 'The Evolution of Canadian Federal Mineral Policies', in *Natural Resources in U.S.-Canadian Relations: the Evolution of Policies and Issues,* vol. 1, (Boulder, Co.: Westview Press, 1980).

Perlman, R.A., *Exploration, Resources and Politics* (London: Commodities Research Unit, 22 February 1976).

Perlman, R.A., *The Outlook for Commodities: When Will The Next Boom Happen?,* (London: Commodities Research Unit, July 1976).

Pindyck, R.S., 'Cartel Pricing and the Structure of the World Bauxite Market', *The Bell Journal of Economics,* vol. 8, no. 2, 1977.

Powis, A., 'Management of Canadian Mineral Resources: An Industry Viewpoint', *Resources Policy,* vol. 2, no. 1, March 1976.

Powis A., *et al., A Report by the Sector Task Force on the Canadian Non-Ferrous Metals Industry,* (Ottawa: Department of Industry, Trade and Commerce, 1978).

Pye, C.H., and Wojciechowski, M.J. (eds.), *International Competition and the Canadian Mineral Industries,* Proceedings no. 2, (Kingston: Centre for Resource Studies, 1978).

Rachamalla, K.S., and Bell, D.H., *Towards a Zinc Policy for the Province of Ontario,* (Toronto: Ontario Ministry of Natural Resources, 1976).

Rachamalla, K.S., and Bell, D.H., *The Ontario Zinc Industry on a Global Scene and Various Government Policies,* Hong Kong, Eleventh Commonwealth Mining and Metallurgical Conference, 1978.

Radetzki, M., *The Potential for Monopolistic Commodity Pricing by Developing Countries,* (Uppsala, Sweden: The Dag Hammarskjold Foundation, August 1974).

Radetzki, M., *Changing Structures in the Financing of the Minerals Industry in the LDCs,* (Stockholm: Institute for International Economic Studies, University of Stockholm, 1980).

Radetzki, M., *International Uranium: Economic and Political Instability in a Strategic Commodity Market,* (Stockholm: Institute for International Economic Studies, University of Stockholm, 1980).

Report of the Royal Commission on the Mineral Resources in Ontario, (Toronto: Warwick & Sons, 1980).

Ridge, J.D., 'Emerging Nations: Their Politics and Economics and the Future of Mineral Supplies', *Journal of Metals,* vol. 25, no. 10, October 1973.

Risch, B.W.K., 'The Raw Material Supply of the European Community', *Resources Policy,* vol. 4, no. 3, September 1978.

Ritter, A.R., *Conflict and Coincidence of Canadian and Less Developed Country Interests in International Trade in Primary Commodities,* Discussion Paper No. 109, (Ottawa: Economic Council of Canada, 1978).

Rogers, P., (ed), *Future Resources and World Development,* (New York: Plenum Press, 1976).

Romney, M.P., 'Minerals in the Life of Man', *Mining Congress Journal,* July 1965.

Rowe, J.W.F., *Primary Commodities in International Trade,* (Cambridge, England: Cambridge University Press, 1965).

Rowe, R.D., *et al., Natural Resources, Foreign Ownership and Economic Development,* Interim Report, Select Committee on Economic and Cultural Nationalism, (Toronto: Queen's Printer, 1974).

Safarian, A.E., *Foreign Ownership of Canadian Industry,* (second edition) (Toronto: University of Toronto Press, 1973).

Santini, J.D., 'The Minerals Junkie', *Journal of Metals,* vol. 29, no. 7, July 1977.

Sengupta, M., 'International Trade in Minerals and Economic Development', *CIM Bulletin,* October 1976.

Sinden, J.A., (ed)., *The Natural Resources of Australia: Prospects and Problems,* (Sydney: Angus and Robertson, 1972).

Skinner, W.R., *Mining International Yearbook,* (London: Financial Times, 1975).

Smith, B., 'Long Term Contracts in the Resource Goods Trade', (mimeo) Canberra, Australian National University, January 1976.

Smith, B., 'The Japanese Connection: Negotiating a Two-Way Street', in Hastings, P., and Farran, A., (eds.), *Australia's Resource Future,* (Melbourne: Thomas Nelson, Australia, Pty. Ltd., 1978).

Smith, D.N., and Wells, L.T., *Negotiating Third World Mineral Agreements: Promises to Prologue,* (Cambridge, Mass.: Ballinger, 1975).

Stein, R., and Walter, I., 'Seabed Resources and International Law', *Resources Policy,* vol. 3, no. 4, December 1977.

Stevenson, G., 'The Process of Making Mineral Resource Policy in Canada', in *U.S.-Canadian Relations: the Evolution of Policies and Issues,* vol. 1, (Boulder, Co.: Westview Press, 1980).

Stewart, L.R., 'Canada's Role in the International Uranium Cartel', *International Organization,* vol. 35, no. 4, Autumn 1981.

Strauss, S.D., 'Does the Pattern of Oil Prices Set a Precedent for Metals?', *Mining Congress Journal,* vol. 60, no. 4, April 1974.

Strauss, S.D., Statement on Behalf of the American Mining Congress Before the Trade Policy Staff Committee, Office of the U.S. Trade Representative, Washington, D.C., 11 April 1980.

Sultan, R.G., 'Canada Without Mines', *CIM Bulletin,* vol. 68, no. 761, September 1975.

Tanzer, M., *The Political Economy of International Oil and the Underdeveloped Countries,* (Boston: Beacon Press, 1969).

Tilton, J.E., *The Future of Non-Fuel Minerals,* (Washington, D.C.: The Brookings Institution, 1977).

Tocher, J.D., *Patterns and Trends in Agreements With Foreign Countries,* International Minerals Acquisition and Operations Institute, (Boulder, Co.: Rocky Mountain Mineral Law Foundation, University of Colorado, 1974).

Toombs, R.B., 'Canadian Production of Minerals and Metals', *Journal of Metals,* vol. 16, no. 7, July 1964.

UNCNRET (United Nations Centre for Natural Resources, Energy and Transport), 'Exploration for Natural Resources in Developing Countries: Financial Requirements and Institutional Mechanisms', Background Paper for the Intergovernmental Group of Experts on Mineral and Energy Exploration, New York, 7 March 1978.

UNCNRET, 'Multilateral Development Assistance for the Exploration of Natural Resources', Report of the Intergovernmental Group of Experts on Mineral and Energy Exploration in Developing Countries, (final draft), New York, August 1978.

Urquhart, E., *The Canadian Nonferrous Metals Industry: An Industrial Organization Study,* (Kingston: Centre for Resource Studies, 1978).

Vagt, G.O., *Asbestos,* MR 155, (Ottawa: Energy, Mines and Resources, 1976).

Van Duyne, C., 'Commodity Cartels and the Theory of Derived Demand', *Kyklos,* vol. 28, 1975.

Wallace, D., (ed.), *International Control of Investment: The Dusseldorf Conference on Multinational Corporations,* (New York: Praeger, 1975).

Walter, I., *A Discussion of the International Economic Dimensions of Secondary Materials Recovery,* Contemporary Issues, No. 2, (Washington, D.C.: International Economic Studies Institute, 1975).

Wansbrough, V.C., 'Removal of Quotas on Lead and Zinc', *Western Miner*, vol. 38, no. 11, November 1965.

Watkins Report (Report of the Task Force on the Structure of Canadian Industry), *Foreign Ownership and the Structure of Canadian Industry*, (Ottawa: Privy Council Office, 1968).

Welling, C.G., 'Ocean Mining Systems', *Mining Congress Journal*, vol. 62, no. 9, September 1976.

Whelan, E., *Facts on Potash*, (Regina: Department of Mineral Resources, 1975).

Whillans, R.T., *Mineral Exploration Expenditures in Canada, 1969-1975*, MR 179, (Ottawa: Department of Energy, Mines and Resources, 1978).

Wilkinson, B.W., *Trends in Canada's Mineral Trade*, Working Paper no. 9, (Kingston: Centre for Resource Studies, 1978).

Wilkinson, B.W., 'Trends in Canada's Mineral Trade: Implications for an Industrial Strategy', in *Canada's Mineral Trade, The Balance of Payments and Economic Development*, Proceedings no. 4, (Kingston, Centre for Resource Studies, 1978).

Winberg, A.R., 'Raw Material Producer Associations and Canadian Policy', *Behind the Headlines*, vol. xxxiv, no. 4, (Toronto: Canadian Institute of International Affairs, 1976).

World Bank, *Development Problems of Mineral Exporting Countries*, Staff Working Paper No. 354, 1979.

Zinc, D.W., *The Political Risks for Multinational Enterprises in Developing Countries: With A Case Study of Peru*, (New York: Praeger, 1973).

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